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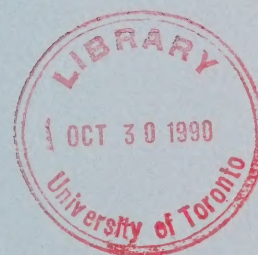
VOLUME: 245

DATE: Tuesday, October 16, 1990

BEFORE:

A. KOVEN Chairman

E. MARTEL Member



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HEARING ON THE PROPOSAL BY THE MINISTRY OF NATURAL
RESOURCES FOR A CLASS ENVIRONMENTAL ASSESSMENT FOR
TIMBER MANAGEMENT ON CROWN LANDS IN ONTARIO

IN THE MATTER of the Environmental
Assessment Act, R.S.O. 1980, c.140;

- and -

IN THE MATTER of the Class Environmental
Assessment for Timber Management on Crown
Lands in Ontario;

- and -

IN THE MATTER of an Order-in-Council
(O.C. 2449/87) authorizing the
Environmental Assessment Board to
administer a funding program, in
connection with the environmental
assessment hearing with respect to the
Timber Management Class
Environmental Assessment, and to
distribute funds to qualified
participants.

Hearing held at the offices of the
Ontario Transport Board, Britannica
Building, 151 Bloor Street West, 10th
Floor, on Tuesday, October 16th, 1990,
commencing at 9:00 a.m.

VOLUME 245

BEFORE:

MRS. ANNE KOVEN
MR. ELIE MARTEL

Chairman
Member

A P P E A R A N C E S

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I N D E X O F P R O C E E D I N G S

<u>Witness:</u>	<u>Page No.</u>
<u>THOMAS C. HUTCHINSON</u> , Resumed	44024
Continued Cross-Examination by Mr. Freidin	44025

I N D E X O F E X H I B I T S

<u>Exhibit No.</u>	<u>Description</u>	<u>Page No.</u>
1428	12-page article entitled: Air Pollution in Forests, a Canadian Perspective, authored by Paul A. Addison, dated June 28th, 1990.	44097
1429	Paper titled: Effects of Experimental Crude Oil Spills on Sub-Arctic Boreal Forest Vegetation near Norman Wells, Northwest Territories, Canada, authored by Hutchinson and Freedman, published in Canadian Journal of Botany, Volume 56, pages 2424 to 2433.	44135
1430	Article entitled: History and Natural Role of Fire in Ontario by T.J. Lynham, published in the Forest Fire Management Symposium, (pps 43 to 48).	44157
1431	MNR Interrogatory Nos. 5 and 20 (FFT Panel No.1), and Nos. 17 and 20, (FFT Panel No. 1A).	44170

1 ---Upon commencing at 9:05 a.m.

2 MADAM CHAIR: Good morning. Please be
3 seated.

4 MR. FREIDIN: I hope people have got
5 those articles that we so diligently pulled together
6 last night still pulled together. If we don't, I
7 will --

8 MADAM CHAIR: Excuse, me Mr. Freidin.
9 Mr. Pascoe, is my source book still in the office?

10 MR. PASCOE: It's just being prepared.
11 Do you want me to bring it in now?

12 MADAM CHAIR: I think we're going to need
13 it, thank you.

14 Sorry, Mr. Freidin. We were working on
15 an intricate tabbing scheme for the source books.

16 MR. FREIDIN: I hope -- well, I hope
17 you've got the same numbers as I do.

18 MADAM CHAIR: Do you want to just go
19 through the list of articles quickly, in case there are
20 others?

21 MR. FREIDIN: You should have the Panel 9
22 witness statement, and I'm going to be referring to two
23 articles there, not just one. I'm going to refer to
24 both of the papers by Foster and Morrison; one is the
25 1976 paper which you'll find at page 66 of the Panel 9

1 - witness statement, that's dealing with jack pine,
2 another paper which I already referred to which starts
3 on page 77 of the Panel 9 witness statement by Foster
4 and Morrison in relation to black spruce.

5 I believe I will refer to the Gordon
6 article which is the 1982 paper which is in source book
7 No. 1, and I believe I will -- yes, I know I will be
8 going back to the Timmer, Savinsky and Marek paper
9 which is also in source book No. 1.

10 MADAM CHAIR: Thank you, Mr. Freidin. I
11 hope we are all set.

12 MR. FREIDIN: Is the Timmer book in the
13 source book or is it in our Panel 10 witness statement,
14 or it may be in your Panel 10 witness statement.

15 MR. HUFF: 416 and 416A.

16 MR. FREIDIN: Yes, in fact I think I
17 marked that. Yes, page 451 of Exhibit 416A.

18 Where we're going to start with the Panel
19 9 witness statement, Madam Chair, at page 66 which is
20 the -- or a paper by Foster and Morrison in relation to
21 distribution and cycling of nutrients in a natural jack
22 pine ecosystem system.

23 So if we have that, I think I can
24 commence.

25 THOMAS C. HUTCHINSON, Resumed

1 CONTINUED CROSS-EXAMINATION BY MR. FREIDIN:

2 Q. Now, Dr. Hutchinson, what I want to
3 do is sort of follow up on the issue I wanted to deal
4 with yesterday and that was replacement time and the
5 reason I want to deal with this is because of your
6 evidence that after full-tree harvesting it would take
7 more than a rotation to replace the nutrients that were
8 lost, and it's that evidence that my questions are
9 directed towards.

10 A. Okay.

11 Q. If you look at page 73 of this study
12 in relation to jack pine, page 117 of the actual
13 article. Do you have that, Dr. Hutchinson?

14 A. Page 17 -- or 73 you said.

15 Q. 73.

16 A. Yes.

17 Q. If we go down to the third full
18 paragraph, the authors say:

19 "During the 65 years it has taken the
20 trees to reach maturity, large quantities
21 of all nutrients have been added to the
22 ecosystem in precipitation relative to
23 those that will be removed in logging.
24 Our assessment of element cycles and the
25 content of available or potentially

1 available nutrients in soil is that
2 adequate reserve of exchangeable
3 potassium, calcium and magnesium and
4 organically bound nitrogen and phosphorus
5 will be maintained in the ecosystem to
6 provide nutrients for a satisfactory rate
7 of growth in the next 60-year rotation
8 even without the elements in the present
9 tree crop."

10 And this was a study dealing with
11 full-tree harvesting of jack pine. Do you accept the
12 accuracy of the authors' conclusions in regard to the
13 site that they studied as reported in this particular
14 paper?

15 A. I have no reason to dispute it.

16 Q. Okay. Can we then turn --

17 A. I don't think it's to do with
18 full-tree harvesting that paper, though.

19 Q. It's not full-tree harvesting?

20 A. Well, if you -- they're looking at
21 natural cycling in the system.

22 Q. Well, sir, it says right in the quote
23 that I read to you:

24 "...satisfactory rate of tree growth in
25 the next 60-year rotation even without

1 the elements in the present tree crop."

2 I suggest to you if you read that article
3 what they're talking about is the removal of the
4 elements in the present tree crop and they're saying
5 notwithstanding that occurring, they believe that there
6 is sufficient nutrients or potentially available
7 nutrients for a satisfactory rate of tree growth in the
8 next 60-year rotation.

9 Now, have you read this article closely
10 enough to disagree with me on that?

11 A. No.

12 Q. You have not read the article closely
13 enough?

14 A. Can I just answer the question?

15 Q. All right.

16 A. You said this article is about
17 full-tree harvesting, I said it's not, it's about
18 nutrient cycling in a natural ecosystem and about
19 extrapolating from that as to what might happen in the
20 case of full-tree harvesting.

21 Q. All right. These authors -- these
22 scientists from the Canadian Forestry Service have done
23 a study on a particular site.

24 A. Right.

25 Q. And they have indicated that in their

1 professional opinion that that site will sustain the
2 next rotation of jack pine which was harvested from
3 that site and:

4 "...provide satisfactory rate of tree
5 growth in the next 60-year rotation even
6 without the elements in the present tree
7 crop."

8 Is that not what they say?

9 A. That's what what they say and I said
10 I have no dispute with that.

11 Q. Do you have any basis on which to
12 disagree with their professional opinion in that
13 regard?

14 A. No, no.

15 Q. Would you turn to the other Foster
16 and Morrison -- turn to the Foster and Morrison
17 article -- I'm sorry, go to the Gordon paper, the 1982
18 Gordon paper. Do you have that?

19 MADAM CHAIR: Is that the 1981 Gordon
20 paper, Mr. Freidin?

21 MR. FREIDIN: No, I think it's 1982, it's
22 entitled: Nutrient Cycling Dyanmics in Differing Spruce
23 and Mixed Wood Ecosystems in Ontario, et cetera.

24 MADAM CHAIR: And that is in our --

25 MR. FREIDIN: Oh, that's Exhibit 423, I

1 have that marked, that's the problem we had yesterday,
2 I'm sorry.

3 MADAM CHAIR: Thank you.

4 MR. FREIDIN: Q. Now, would you turn to
5 page 115 of that paper and on page 115 under
6 conclusions, No. 10, in relation to the study which
7 Gordon did or after doing the study he came to the
8 conclusion, Replacement times...", No. 10:

9 "Replacement times which take into
10 account the foregoing reserves and also
11 nutrient inputs and cycling were
12 relatively short, mostly 20 years or
13 less. Potassium, however, may take up to
14 45 years to return to pre-harvesting
15 levels for site class 1 spruce. Extended
16 times to account for losses due to
17 initial leaching were not great, only
18 increasing replacement times by five to
19 seven years. There are many limitations
20 to predicting exact rotation ages,
21 however, long replacement times can lead
22 to increasing rotation ages."

23 I have no question, the last comment is a
24 trueism. Would you agree that Gordon, based on the
25 study he did on this site with the species he looked

1 at, indicated that the longest replacement time for any
2 of the nutrients that they were concerned about would
3 be 45 years and that was in relation to potassium?

4 A. Yes.

5 Q. All right.

6 A. A. And then he also pointed out, you
7 have to add another seven years for leaching losses, so
8 that would take it to 52.

9 Q. Okay.

10 A. There's a degree on that.

11 Q. Could we turn back to Panel No. 9
12 witness statement and could we go to the article by
13 Foster and Morrison in relation to black spruce.

14 If we look at page 80 of that -- pardon
15 me, page 80 of the witness statement, page 454 of the
16 actual report, if we go to the heading Nutrient
17 Replenishment on the right-hand side of the page and we
18 go down to the last four lines.

19 That is page 80, the last four lines on
20 the right-hand column, under the heading Nutrient
21 Replenishment, the authors conclude that:

22 "Weathering and precipitation inputs
23 together are greater than an annual
24 prorated projected nutrient loss that
25 is due to full-tree harvesting and this

1 suggests that nutrient losses are
2 replaceable."

3 And I suggest to you --

4 MS. SWENARCHUK: Where are you?

5 MR. FREIDIN: The very bottom of page 80,
6 the last four lines.

7 Q. And I suggest to you that the authors
8 are saying in this particular case that even with
9 full-tree harvesting their calculations suggest that
10 nutrient losses are replaceable within the rotation
11 period of the originally harvested stand.

12 Do you agree or disagree that that is the
13 conclusion that those scientists from the Canadian
14 Forestry Services came to?

15 A. Yes, for those sites that was the
16 conclusion they came to.

17 Q. All right.

18 A. They didn't -- they don't seem to have
19 said anything about phosphorus in that particular
20 nutrient replenishment, the two paragraphs there I don't
21 see phosphorus mentioned. I know Foster has concerns
22 about whether phosphorus can be replaced.

23 Q. All right. Well, let's deal with
24 that and let's also deal with a paragraph in this
25 particular article which, without some discussion, I

1 think might cause some confusion to a lay person.

2 A. All right.

3 Q. Because I don't want someone possibly
4 to read portions of this and be misled about what they
5 are. I want you to go back to the top of page 80,
6 please, and I'm going to ask you some questions about
7 the paragraph which appears immediately above the
8 heading Nutrient Replenishment, okay?

9 A. Right, yes.

10 Q. Now, before I do that, I want to ask
11 you whether you will agree with the following
12 propositions. Would you agree that on any given site
13 at any given point in time that there is a difference
14 between exchangeable reserves of nutrients and total
15 reserves of nutrients?

16 A. Yes.

17 Q. If we look at the paragraph on page
18 80 and we look at -- go up six or seven lines to where
19 it says, "exchangeable reserves", do you see that?

20 A. Mm-hmm, yeah.

21 Q. It says:

22 "Exchangeable reserves are dynamic,
23 changing in response to the release of
24 nutrients from the much larger content
25 associated with primary minerals in the

1 soil. The size of exchangeable pools is
2 dependent on the rate of biological and
3 geochemical reactions in the soil and on
4 nutrients received from atmospheric
5 sources."

6 Do you agree with the accuracy of that
7 proposition in science?

8 A. Just bear with me for one moment
9 while I scan it. Yes, that seems to be in relationship
10 in that paragraph to conventional harvesting.

11 Q. Well, we'll get into that, but you
12 agree--

13 A. Well, that paragraph has conventional
14 harvest.

15 Q. --that that is an accurate statement
16 of science?

17 A. Yes, that's an accurate statement.

18 Q. All right. And when he says that
19 exchangeable reserves are dynamic, I suppose you could
20 also say then, exchangeable reserves are not static?

21 A. Yes.

22 Q. Now, if we go to the beginning of
23 that paragraph they're talking -- they say -- they talk
24 about black spruce, they talk about hundred year
25 rotation and they talk about conventional harvesting.

1 So let's just review that, and then I
2 want to ask you some questions. It says:

3 "There were sufficient nutrient reserves
4 in the soil to replace the projected
5 nutrient drain associated with
6 another 100-year rotation of spruce if
7 conventional harvesting were conducted.
8 Calcium and potassium removals by
9 full-tree harvesting would exceed the
10 reserves of extractable calcium and
11 potassium in the soil. Phosphorus...",

12 there's the reference to phosphorus,

13 "...phosphorus and magnesium removals
14 would not. As Weetman and Webber have
15 pointed out, however, exchangeable
16 nutrient reserves are not necessarily
17 those nutrients that are available to the
18 vegetation."

19 Now, I wanted to take you to this because
20 when one --

21 MS. SWENARCHUK: Can you just tell me
22 where you're reading?

23 MR. FREIDIN: I'm reading from page 80
24 right at the top right-hand corner.

25 Q. I wanted to take you to that, Dr.

1 Hutchinson, because it was my concern that if one read
2 the conclusion that I put to you at the bottom of the
3 page about full-tree harvesting, the nutrients being
4 replaced within the rotation, somebody might -- upon
5 reading the paragraph we're now dealing with, might
6 think that there was a contradiction in the paper.

7 And I wanted to have you confirm that my
8 understanding is correct, that the paragraph at the top
9 which I've just read which talks about conventional
10 harvesting is not in any way contradictory to the
11 conclusion which I read to you at the bottom of the
12 page. Would you agree with that?

13 A. Well, you know, I think that would
14 require really studying the paper again, but--

15 Q. Well --

16 A. --the upper paragraph is to do with
17 exchangeable reserves, and certainly there's
18 exchangeable reserves and, you know, these are -- and
19 so I have no difficulty with that.

20 Q. I want you, Dr. Hutchinson -- and if
21 it means you have to read this paper, I want you to
22 come back to me before you leave the stand, and I want
23 you to tell me whether you agree with me that the
24 statement at the top of page 80 in the paragraph we're
25 talking about in no way is contradictory to the

1 conclusion that the authors have come to in relation to
2 full-tree harvesting and replacement of the nutrients
3 within the rotation?

4 A. Well, for their sites they're saying
5 at the bottom of the page that, "weathering and
6 precipitation inputs would be sufficient to replace
7 sites in a rotation". They seem to be talking about a
8 hundred year rotation, that's what we already agreed
9 on.

10 At the top they're talking about the
11 sufficiency of reserves in the soil and they're talking
12 about conventional harvesting and they say, for calcium
13 and potassium the removals by full-tree harvesting will
14 exceed, the reserves for phosphorus and magnesium
15 removals would not.

16 Q. But that's not a contradiction?

17 A. There's no contradiction. I could
18 agree there's no contradiction, but they also have to
19 point out they're talking about their own site - I
20 think you will accept they're talking about their own
21 sites - and there's another paper by Foster in which he
22 expresses concern about the ability of precipitation to
23 replace the phosphorus levels.

24 Q. All right. It depends on site, and I
25 agree the literature indicates that you have to look at

1 this based on site and you can't generalize from one
2 study which is in relation to one site to other sites.
3 I think's general -- that's accepted; is it not?

4 A. Fine.

5 Q. All right.

6 A. The witness statement, you know, that
7 I introduced, dealt with concerns about nutritionally
8 poor sites.

9 Q. Yes, all right. We'll deal with
10 those in a minute. Can we go back to Timmer and Marek,
11 which is now --

12 MS. SWENARCHUK: What page is that?

13 MR. FREIDIN: It's in witness statement
14 No. 10 starting at page 451.

15 Q. And you may recall, Dr. Hutchinson,
16 this is where we started this discussion about
17 replacement time.

18 A. Right.

19 Q. I think we did it because we were
20 looking at page 9 of the witness statement and the
21 numbers that you had there, okay.

22 Now, I want to go back to the
23 conversation we had yesterday and, first of all, would
24 you agree that what the authors have done in the Timmer
25 and Savinsky paper and what you have reflected that

1 they have done through your chart or numbers that are
2 on page 9 of the witness statement, is that they looked
3 at the - make sure I get this accurately - they looked
4 at the total -- why don't we just turn to page 137,
5 just so -- maybe make this is faster.

6 A. 137 of that paper?

7 Q. Yes.

8 A. Okay.

9 Q. Which is on page 457 of the Panel 10
10 witness statement. What they did in terms of
11 measurements at the time of or immediately after
12 harvest was that they made estimates of soil nutrient
13 reserves --

14 MS. SWENARCHUK: Where are you?

15 MR. FREIDIN: Under the heading
16 Laboratory Analysis on page 457.

17 Q. It says:

18 "Estimates of soil nutrient reserves were
19 based on analysis of total nitrogen,
20 phosphorus, potassium, calcium and
21 magnesium in the forest floor and the
22 total nitrogen and available phosphorus
23 and exchangeable calcium --", pardon me,
24 "...potassium, calcium and magnesium
25 in the mineral horizons."

1 And it was from those estimates that they
2 then hypothesized the demands on that calculation of
3 the trees.

4 A. Right.

5 Q. And they depleted from that total
6 that they measured -- or estimated at the time of
7 harvest, and they just kept reducing it as the tree
8 kept using it up until in some cases they suggested
9 that they ran out of some. That's what they did.

10 A. Yes.

11 Q. Can we agree - I think you agreed
12 with me yesterday - that these authors did not take
13 into account any input of nutrients through
14 precipitation.

15 A. I think that's correct, yes.

16 Q. Okay. They also did not take into
17 consideration any addition of nutrients over the
18 rotation through the decomposition of litter which
19 might be added to the site during the rotation of those
20 trees; am I correct?

21 A. Yes, but where would it get the
22 nutrients for that litter that it's got to make.

23 Q. Dr. Hutchinson--

24 A. Yes.

25 Q. --just answer the question first,

1 please.

2 MS. SWENARCHUK: Excuse me. He's
3 entitled to answer the question as he sees fit.

4 MR. FREIDIN: Well, all right, but I'm
5 not --

6 THE WITNESS: I shouldn't put questions,
7 correct.

8 MR. FREIDIN: Q. You're asking me a
9 question.

10 A. Yeah, I won't ask you questions.

11 Q. Am I correct that they did not take
12 into account, when they were trying to see what
13 happened as the trees took up nutrients, they did not
14 take into account any additions of nutrients which
15 would occur through the decomposition of litter which
16 would fall from the trees onto the site over the
17 rotation period?

18 A. Right, but that would be double
19 counting, so no wonder they didn't take that into
20 account. That would be double counting because --

21 Q. Double counting of what?

22 A. Well, the nutrients that are going to
23 make the litter which will fall of the the trees in the
24 future must already be in the reserves in the soil,
25 plus the precipitation that comes in. So the only they

1 they missed out would be the precipitation coming in.

2 Q. Dr. Hutchinson, if you have a forest
3 floor which is that thick - and I'm indicating to
4 you --

5 A. But it has to be made from something.
6 It has to be made from nutrients.

7 Q. All right, but no, no. If you've got
8 a forest floor right after harvest which is, let's say,
9 a foot thick.

10 A. Yes.

11 Q. And you say the trees are going to
12 use that as it decomposes, over time you're going to
13 lose that foot and you're going to end up with no
14 forest floor, no nutrients coming from the forest
15 floor.

16 A. Right.

17 Q. That's what these authors did; isn't
18 that right?

19 A. They --

20 Q. They said, we will measure how much
21 nutrients -- they estimated how much nutrients were in
22 the forest floor.

23 A. Yes.

24 Q. And then they said, it was going to
25 be reduced over time:

1 A. Mm-hmm.

2 Q. As the trees used up whatever
3 nutrients that they could get from that forest floor.

4 A. Right.

5 Q. Now, the author we know -- you would
6 agree; do you not, that over the rotation that you may
7 have a forest floor of a foot to start with, but over
8 the rotation there's litter falling from the trees
9 every year or, you know, and it keeps coming down and
10 in the boreal forest it continues to build up, so that
11 over a rotation, let's say if it's a hundred years, the
12 amount of nutrients that you'll get from decomposition
13 of the forest floor will be more than the foot, it will
14 be the foot which was there when you harvested plus
15 some of the additional litter which falls over the
16 hundred years and it decomposes as well.

17 A. Right.

18 Q. All right.

19 A. Yes.

20 Q. So I suggest to you it's not double
21 counting, that if what you're trying to do -- that
22 these authors -- we agree, these authors did not give
23 any weight at all to the fact that over the rotation
24 this litter will fall and over the rotation there will
25 be more than just the foot that was there after

1 harvest, there will be the foot plus everything else
2 that falls and decomposes over the hundred years. We
3 agree they didn't do that; right?

4 A. Right.

5 Q. You say that it would be double
6 counting.

7 A. Yes.

8 Q. You still say it would be double
9 counting?

10 A. Yes, I still say it would be double
11 counting. You see, that litter that is falling must
12 have been made from something and it has to be made
13 from the nutrient reserves in the soil, both your
14 exchangeable and your slower release ones, plus a dash
15 of precipitation that's coming in. So the bit they
16 missed out was the precipitation.

17 Q. Dr. Hutchinson, the authors
18 subtracted the use of this forest floor in the article
19 but they didn't have any -- take any account of the
20 additions of the floor. That doesn't seem to be like
21 double counting at all, it seems like you're just
22 taking away from one end all the time.

23 A. No, but if you're starting from
24 scratch and we have, you know, we're establishing a new
25 forest and they're trying to estimate how much

1 nutrients are there to establish that new forest, there
2 is several sources, I think we can agree very easily on
3 this, there's the forest floor, the organic mat.

4 Q. Yes.

5 A. And then there's the mineral
6 underneath and they've decided to go down to rooting,
7 they're going to look at the rooting depth.

8 Q. Yes.

9 A. Look at that, and then they're going
10 to go down to what they call an exploitable soil depth
11 which is down to one metre.

12 Q. Yes.

13 A. Okay. Now, that's going to basically
14 build your trees. There may be -- they've assumed that
15 the weathering from beneath the metre isn't going to be
16 able to get up to the rooting depth, and on top of that
17 we've got stuff coming in from the atmosphere,
18 precipitation and snow and dustfall and that.

19 Q. But you also --

20 A. Now, as the trees are built and they
21 keep dropping litter back on to the ground, that's not
22 additional, it hasn't come magically from somewhere
23 else, it has come from the soil plus the precipitation.

24 Q. But these authors have just said what
25 comes up and the way they've done the calculation they

1 assume that it stays up in the tree and never gets back
2 down into the soil because they say it's just never
3 there for the trees anymore, but we know that the stuff
4 doesn't stay up in the trees for a hundred years it
5 falls down all the time.

6 And the way they did their calculation;
7 do you not agree, that it assumes -- they assume for
8 the purpose of their calculation that all of the
9 nutrients which got taken up by the tree from the soil
10 stayed up in the tree or disappeared from the site;
11 isn't that what they --

12 A. Well, they're looking at the nutrient
13 input on a hundred year forest.

14 Q. Yes or no?

15 A. Oh, you want yes or no. Well, I
16 don't think so, I don't think that's what they've done.

17 Q. All right. That's your opinion.

18 A. Yeah.

19 Q. Others may take other opinions.
20 That's fine. I just want your opinion. Am I correct
21 or incorrect, Dr. Hutchinson, that these authors did
22 not when determining -- making a calculation as you've
23 referred to on page 9 of your witness statement, they
24 did not consider any increase or addition of nutrients
25 to the site over rotation based on mineral weathering,

1 A. Based on mineral weathering. That
2 would be largely true, yes, I think so, but since they
3 have done that to a depth of one metre they've kind of
4 assumed that the mineral weathering below that would
5 not contribute.

6 Q. Did they -- All right. Are you
7 saying that they did consider it and they came to the
8 conclusion that it would provide nothing, or are you
9 saying that they did not consider it?

10 A. I'm saying that they partially
11 considered it.

12 Q. They partially considered it. How
13 did they consider it?

14 A. Well, because they have decided to
15 set a depth of one metre, okay, so they've looked at
16 exchangeable and total reserves down to a depth of one
17 metre.

18 Q. When they looked --

19 A. Well, Table 8 would give you an
20 indication, or Table 7 would give you an indication of
21 how they've used this one metre maximum depth.

22 Q. That --

23 A. You see the exploitable soil depth
24 there is one metre.

25 Q. Right. But, Dr. Hutchinson, that

1 table; am I not correct, that it talks about the
2 nutrients which were estimated to be exchangeable at
3 the time the calculations were made; right?

4 A. Right, what they've been able to
5 analyse, right.

6 Q. And we've already agreed that - and
7 let me get the exact words - exchangeable reserves are
8 dynamic; i.e., you agreed with me exchangeable reserves
9 are not static?

10 A. That's right.

11 Q. And I'm suggesting to you that what
12 they've done here is they've calculated the
13 exchangeable reserves at a point in time; i.e., static,
14 and they have just reduced that number over time and
15 they've given no weight or -- no weight to the fact or
16 consideration to the fact that mineral weathering will
17 occur in that site over the rotation and, thereby, add
18 nutrients to the static measurement, the static
19 situation in terms of exchangeable nutrients that they
20 made at the time of harvest; wasn't that right?

21 A. Yeah.

22 Q. Thank you. Now, you know, we've
23 heard a lot of evidence here, Dr. Hutchinson, about
24 replacement times and we've heard about articles that
25 have talked about concern about what would happen if

1 you full-tree harvest and everything, and Mr. Martel -
2 and part of the reason I got into this whole area - was
3 Mr. Martel asked how much is removed from full-tree
4 harvesting versus the amount which is required over
5 time to produce a tree.

6 And you said: Well, we can say what's in
7 the tree now, you say we can measure the difference in
8 removal, but it's a great puzzle to see how much is
9 needed.

10 Now, I would like to sort of step back,
11 if I might, and take perhaps what might be a - see
12 whether you agree at the end of all this - is a common
13 sense or logical sort of look at all this thing in the
14 absent of all these numbers.

15 Am I correct, Dr. Hutchinson, that in
16 situations where numbers may not be exact, the science
17 might not be as precise as everyone would like, that
18 sometimes to make predictions as to whether you should
19 or not do something you look at the worst case scenario
20 and sort of see how things are going; in other words,
21 if what's occurring in the worst case scenario, if you
22 look at that, it might provide some insight as to the
23 type of response which is necessary to concerns being
24 raised?

25 A. Yes, that's the way it's done.

1 Q. Are you aware of the area of southern
2 Ontario where, through agriculture, the soils were
3 depleted of nutrients and they turned into what is
4 called blowsands?

5 A. The Durham and Northumberland
6 regional forests are you talking about?

7 Q. Yes, that kind of thing, yes.

8 A. Yes.

9 Q. And are you aware of what occupies
10 those sites now?

11 A. Yes.

12 Q. Am I correct that it's -- and it's my
13 understanding that what occupies those sites now is
14 sites class 1 and 2 red pine; is that correct?

15 A. Yeah.

16 Q. Are you able to describe the site
17 characteristics of those blowsands at the time of
18 planting, and let's perhaps do it this way: Could you
19 describe for me those sites in terms of the forest
20 floor?

21 A. At the time of planting I should
22 think that -- well, these were sandy soils, they were
23 used for agriculture for a number of years and they got
24 into serious problems of erosion and sands blowing
25 around, so they were no longer suitable to agriculture.

1 I presume also there was some nutritional problems,
2 otherwise they would have been maintained.

3 Q. Sir, but to answer my question, there
4 was no forest floor?

5 A. They were fields.

6 Q. They were fields.

7 A. Yes.

8 Q. So can we agree there was no forest
9 floor in those situations?

10 A. Yes, we can.

11 Q. So in terms of the nutrients in the
12 soil, I think you indicated that they were abandoned
13 because the nutrients had been depleted so much that
14 they could no longer support agricultural crops?

15 A. I never indicated that, you
16 indicated -- you said they were nutrient poor and
17 blowing sand, I agreed that that was basically the
18 case.

19 Q. All right. They were nutrient poor?

20 A. Mm-hmm, they were from the beginning,
21 yes.

22 Q. All right. They raised agriculture
23 crops on that land for some time; did they?

24 A. Yes.

25 Q. They abandoned those lands?

1 A. Yes.

2 Q. Why did they abandon the lands?

3 A. Because it was no longer suitable for
4 sustaining agriculture.

5 Q. All right. Do you think that had
6 something to do with the fact that the nutrients which
7 were there perhaps when they started and grew a few
8 crops were not longer there, at least not in sufficient
9 quantities?

10 A. That's right. And they also depleted
11 the organic matter.

12 Q. Okay. And what would you expect if
13 anything in terms of the presence of mycorrhiza in
14 those soils where they were blowsands?

15 A. What would I expect?

16 Q. In comparison to the boreal forest.

17 A. Well, they would have been depleted
18 compared with what was in the original forest.

19 Q. It's my information, Dr. Hutchinson,
20 that those trees that we referred to, those red pines,
21 are now 60 to 65 years old.

22 MS. SWENARCHUK: Well, Mr. Freidin, are
23 we going to hear evidence?

24 MR. FREIDIN: You certainly will.

25 Madam Chair, I said this before: Any

1 time I make a suggestion to the witness, if he agrees
2 with it, I don't have to call reply evidence; but if he
3 can't agree with it, he doesn't know, I'm obviously
4 planting something in the Board's mind, I have an
5 obligation to call reply evidence to support my
6 suggestions and I intend to do that during reply
7 evidence.

8 Q. So are you able to confirm for me,
9 sir, that the trees in those areas, the red pines we
10 are talking about, are 60 to 65 years old?

11 A. Well, yes, I agree, I think that's
12 about the age they are, I think.

13 Q. Thank you. And would you agree that
14 what we have described in terms of those blowsands is a
15 situation in terms of nutrient availability, either
16 total reserves or exchangeable nutrients, which is a
17 worst case scenario and is much worse - I want to make
18 sure I don't use qualifiers that I shouldn't - much
19 worse than any site, any forested site in the boreal
20 forest after full-tree logging?

21 A. I couldn't possibly agree to that.

22 Q. You couldn't?

23 A. You want me to agree that the
24 blowsands in 1910 or 1920 were worse than any site in
25 terms of nutrients in the boreal forest. How could I

1 possibly agree to that? What's the evidence? There's
2 no measurements made of the nutrients in those cases at
3 all.

4 See, what it demonstrated was that you
5 can't continue to grow high nutrient demanding
6 agricultural crops on nutrient poor sands, and part of
7 the problem was blowing sand and part of it was
8 presumably a nutrient thing, but there's no actual
9 assessments done at the time.

10 Q. But we can agree that there was no
11 forest floor?

12 A. Yes, that's right.

13 Q. So any nutrients that would come from
14 a forest floor in a forest setting weren't on the
15 blowsands; correct?

16 A. Right, yeah. Well, we can agree that
17 the nutrient supply in those blowsands must have been
18 very limited. Is that satisfactory to you?

19 Q. No, no. Sir, do you agree that when
20 one is making a determination as to whether to
21 full-tree harvest or not that one would want to
22 consider a number of factors, and I will just list them
23 for you.

24 We talked about nutrients. Forest stand
25 variability in terms of whether it's uniform or mixed

1 wood?

2 A. Yes.

3 Q. The forest stand conditions in terms
4 of age, species and composition?

5 A. Mm-hmm.

6 Q. Economics?

7 A. Mm-hmm.

8 Q. Labour and safety?

9 A. Mm-hmm.

10 MR. CASSIDY: Can we have it noted on the
11 record that the mm-hmm is a yes.

12 THE WITNESS: Oh I'm sorry, yes, all my
13 mm-hmms are yeses.

14 MR. FREIDIN: Q. Silvicultural
15 considerations primarily in terms of whether you want
16 to plant or rely on natural regeneration?

17 A. I'm sorry, I missed the last one.

18 Q. Silvicultural considerations, for
19 instance, whether you want to plant or rely on
20 artificial regeneration?

21 A. Yes.

22 Q. Let's put it, plant or rely on
23 natural regeneration, I'm sorry. Yes?

24 A. Yes.

25 Q. Would you turn to the Mahendrappa

1 article.

2 MR. CASSIDY: Is that Exhibit 1409, Mr.
3 Freidin?

4 MR. FREIDIN: No, this is a 1988 article
5 in source book No. 1.

6 THE WITNESS: 1988 or 1986?

7 MR. FREIDIN: '86, Dr. Hutchinson.

8 MADAM CHAIR: Ms. Swenarchuk, do we have
9 that in our source book 1? I don't think so.

10 MS. SWENARCHUK: I think that was a
11 previous exhibit actually. Wasn't it 424 or something?

12 THE WITNESS: It says 424 on it.

13 MR. FREIDIN: Ah, well...

14 MS. SWENARCHUK: It looks like this.

15 (indicating)

16 MADAM CHAIR: Which page are we on, Mr.
17 Freidin?

18 MR. FREIDIN: I'm going to be referring
19 to page 564.

20 Q. Before I do that -- before I do that,
21 Dr. Hutchinson, this paper by Mahendrappa; am I
22 correct, it reviews all the various inputs and outputs
23 of nutrients and Mahendrappa comments in relation to
24 each of them if you went through the entire paper?

25 A. Yes, it dealt with microorganisms.

1 Q. I see. Now, I don't want to take the
2 time to go through every one of those, if you feel that
3 you have to go back for some reason, feel free, I want
4 to go right to the summary and conclusions. I'm going
5 to read certain portions and I want you to indicate
6 whether you agree or you disagree with the accuracy of
7 the statement. The author says:

8 "The nutrient demands of trees are
9 distinctly different from those of
10 agricultural crops. Long periods
11 required for the trees to reach
12 merchantable size and large variations in
13 their nutrient demands before and after
14 crown closure certainly contribute to the
15 differences. The differences are also
16 closely linked to the nutrient cycling
17 processes in the forests, soil, plant
18 atmospheric continuum."

19 Can you agree that that is an accurate
20 statement?

21 A. Mm-hmm, yes.

22 Q. It says next:

23 "The rate of change or flux of some
24 nutrients through nutrient cycling
25 processes far exceeds the estimated

1 nutrient demands of trees or their
2 availability from soils; for example, the
3 estimates of retranslocation of nutrients
4 within certain species of trees
5 constitutes 50 to 60 per cent of their
6 annual requirements. The sum of certain
7 nutrients annually returned from trees to
8 the ground as stem flow, throughfall and
9 litter fall is much larger than the net
10 quantities of nutrients annually
11 accumulated in the trees."

12 Do you agree with that?

13 A. Yes.

14 Q. It then says:

15 "Fast turnover of fine roots in forest
16 stands is estimated to contain three to
17 ten times the nutrients found in litter
18 fall."

19 A. Right, question.

20 Q. You agree with that?

21 A. Yes.

22 Q. "The significance of nutrients
23 derived as a result of fine root turnover
24 in meeting the demands of trees is
25 not known. These processes --", all

1 right. Do you agree with that?

2 A. It's not known in full data, yes, I
3 agree.

4 Q. "These processes are distinct
5 characteristics of forest trees. While
6 the flux of nutrients through these
7 processes is related to tree growth, it
8 is independent of availability
9 estimates."

10 And I interpret that as meaning that the
11 contribution that comes from the turnover, the fast
12 turnover of fine roots is not taken into account when
13 one does availability estimates such as we have seen in
14 the articles that we have discussed. Do you agree?

15 A. Well, that's a very broad statement
16 in the articles we've discussed; in some of them, yes.

17 MADAM CHAIR: Excuse me, Dr. Hutchinson,
18 could you explain to the Board what fast turnover of
19 fine roots is exactly.

20 THE WITNESS: Well, he found these very
21 fine absorbing roots and these only have a rather
22 transient life, so that they are constantly replaced
23 and constantly dying.

24 MADAM CHAIR: Are they at shallow or at a
25 deeper soil depth?

1 THE WITNESS: They are generally in
2 shallow, shallow soil.

3 MR. FREIDIN: Q. And Dr. Hutchinson,
4 when it says that:

5 "While the flux of nutrients through
6 these processes is related to tree
7 growth, it is independent of availability
8 estimates."

9 Will you agree with me that the reference
10 to availability estimates is a reference to estimates
11 of nutrients which are available in the soil as opposed
12 to total nutrient reserves in the soil?

13 A. Yes, to an extent I think that's
14 true.

15 Q. Fine, thank you. It says:

16 "By the ability of trees to form an
17 association with mycorrhizal fungi and
18 to absorb organic molecules containing
19 nutrients (nitrogen in particular) trees
20 have circumvented the need for the
21 Mineralization process which is the basis
22 of availability estimates of nutrients in
23 the soil."

24 Now, again, the reference to availability
25 estimates means those measurements which measure

1 available nutrients at a point in time as opposed to
2 measurements or estimates of total reserves; would you
3 agree?

4 A. Yes.

5 Q. Now, are you able to agree or
6 disagree with the comment -- it says:

7 "Trees have circumvented the need for
8 mineralization process..."

9 I wasn't too sure whether that was
10 accurate or not, and can you advise me whether you're
11 able to agree with that, the way it's stated?

12 A. Well, it means on the short -- I take
13 this to mean that on the short term the functioning
14 mycorrhizal systems can obtain materials which might
15 otherwise require mineralization.

16 Q. Right. Okay. So I think, just to
17 make sure I understand it, I think we agree. I
18 interpret that as saying that with the mycorrhiza you
19 may be able to get by with a slower rate of
20 mineralization than you might be able to without
21 mycorrhiza; in other words, with mycorrhiza you don't
22 need this fast mineralization as you do with
23 mycorrhiza?

24 A. Right. Now, that's with particular
25 reference to nitrogen.

1 Q. Yes, okay. And so --

2 A. With phosphorus it's a bit different.

3 Q. Right. So we're agreeing?

4 A. Yes.

5 Q. In general we're agreeing?

6 A. We seem to be agreeing, yes.

7 Q. Good. This says:

8 "Trees also benefit from various inputs
9 like atmospheric deposition, nitrogen
10 fixation and weathering."

11 Do you agree?

12 A. Yes.

13 Q. And then he says:

14 "Several challenges lay ahead of us.
15 The roles of various nutrient cycling
16 processes and fine root turnover in
17 affecting the nutrient availability to
18 trees are not understood. The mechanisms
19 involved in the ability of trees to
20 absorb organic nitrogen compounds needs
21 to be elucidated. It is imperative that
22 a method of are estimating nutrient
23 availability indices be developed in such
24 a way that various contributions of
25 Nutrient cycling processes are

1 incorporated in the formula."

2 Is that a point of view that you would
3 endorse?

4 A. Well, apart from when he says it's
5 not understood, I think that it's partially ly
6 understood.

7 Q. Right. Other than that, you have no
8 disagreement with the comment?

9 A. No.

10 Q. And he concludes:

11 "In view of these, it is obvious that the
12 representativeness of point estimates of
13 plant available nutrients determined with
14 the conventional methods is limited.
15 Extreme caution should, therefore, be
16 exercised in using such estimates for
17 inferring their ecological significance
18 and for modeling endeavours."

19 Do you agree with that comment?

20 A. Yes.

21 Q. And now, Dr. Hutchinson, after
22 reviewing all of this literature and all of the
23 evidence that we have heard on full-tree harvesting
24 from you to date, would you agree or disagree that a
25 positive and a reasonable move in the direction of

1 dealing with full-tree harvesting would occur if the
2 Board imposed, as a term or condition, a requirement
3 that the Ministry of Natural Resources develop the
4 terms of reference for and initiate a study pertaining
5 to the effects of full-tree harvest on long-term forest
6 productivity?

7 MR. MARTEL: Do you want to run that one
8 by me again?

9 MR. FREIDIN: I'm asking him what --

10 MR. MARTEL: I'm trying to understand the
11 question.

12 MR. FREIDIN: Q. The question was: MNR
13 shall develop the terms of reference for and initiate a
14 study pertaining to the effects of full-tree harvest on
15 long-term forest productivity.

16 A. If could I add my own rider on the
17 end of that, I would agree with that.

18 Q. Right. And you're quite -- you go
19 ahead and add any rider you want.

20 A. And in the meantime we should be very
21 cautious about where we're carrying out full-tree
22 logging because we haven't got the information in to
23 make the decisions which we seem to have already made.

24 Q. I think that is probably the bottom
25 line of your evidence on that matter. Well, let's move

1 to another matter, and this is nutrient related, it's
2 site productivity related and deals with the issue of
3 acidification of sites. Just a moment, I'm sort of
4 lost.

5 Just to begin with, in MNR Interrogatory
6 No. 24 for Panel 1A we asked a question regarding the
7 occurrence of forest decline and dieback in Quebec and
8 Ontario maples, and your comment in the witness
9 statement was that:

10 "Air pollution is believed to be a major
11 factor in this, with other contributing
12 factors perhaps including insect
13 defoliation, climatic extremes."

14 And we asked you to provide references
15 for the statement and you referred us to a number of
16 sources, one of which was to contact a number of
17 people; one was a D. McLaughlin at the Ministry of the
18 Environment, one was a P. Addison of Canadian Forest
19 Service, and one was D. Lachance of the Canadian Forest
20 Service.

21 Why did you refer us to Mr. Addison?

22 A. Because he's one of the people with
23 the Canadian Forest Service who's been dealing with
24 aspects of forest decline.

25 Q. I'm sorry, aspects of...?

1 A. Forest decline.

2 Q. And does he have a particular
3 expertise in relation to that subject matter?

4 A. Well, his original research concerns
5 sulfur dioxide effects on forests in Alberta, I think,
6 so he has expertise in it.

7 Q. Is that acid precipitation?

8 A. Well, no, it was gaseous sulfur
9 dioxide.

10 Q. And are you in any position to
11 comment on his expertise in relation to the subject
12 matter of acid precipitation in Ontario.

13 A. Oh, I think he's knowledgeable in
14 terms of acid precipitation too.

15 Q. And are you able to comment on your
16 understanding of the extent to which he may be expert
17 in the effects of acid precipitation in the forest?

18 A. Well, he's got access to the
19 information directly from Canadian Forest Services, so
20 he's kind of the chief people who is now their
21 spokesman on these things, and he plugs into the
22 different Canadian Forest Service groups in Fredericton
23 and Petawawa and so on.

24 Q. Now --

25 A. He's not doing active research on it

1 himself.

2 Q. Okay. I think you've stated that
3 acidification occurs naturally within the forest
4 ecosystem?

5 A. Right.

6 Q. And would you turn to your witness
7 statement, page No. 18, please.

8 MS. SWENARCHUK: This is 1A?

9 MR. FREIDIN: No, this is 1, 1.

10 Q. And at the bottom actually of page
11 17 -- yes, I think where you begin to comment about
12 atmospheric acidic inputs and acidification of sites in
13 general; is that correct. Just so I know that we're at
14 the right place, it goes on from there right through to
15 page 21.

16 A. Yes,

17 Q. All right. Now, on page 18 you refer
18 to the work of Nykvist and Rosen, 1985, right at the
19 very bottom almost.

20 A. Right.

21 Q. And if we go over to page 19 and 20,
22 would you confirm that my understanding -- well, just
23 tell me whether my understanding is correct. As I read
24 the witness statement on pages 19 and 20 in relation to
25 that article, I believe it's consistent with your oral

1 evidence that after bole harvest or tree-length harvest
2 you get arise in pH and what that really means is a
3 reduction in acidity; is that right?

4 A. Yes.

5 Q. But in contrast to that, when you
6 full-tree harvest you get a decrease in pHw hich is
7 what you refer to on page 20 as soil acidification
8 occurring; is that right, about five lines down?

9 A. Mm-hmm, yes.

10 Q. And the concern that we have about
11 soil acidification occurring is are the unfavorable
12 things that you have highlighted on page 20 and which
13 you highlighted in your oral evidence, the
14 unfavorable--

15 A. Yes, unfavorable.

16 Q. Okay. Now, where, Dr. Hutchinson, in
17 the article that you have relied upon in support of
18 that evidence does it indicate that after full-tree
19 harvesting the pH went down, or putting it another way,
20 where in the article that you relied on for all of that
21 evidence does it say that after full-tree harvesting
22 there was an increase in acidity?

23 A. In Maliondo, or...?

24 Q. In Nykvist and Rosen that you are
25 relying upon.

1 A. Right. Okay. If you bear with me I
2 will just get that out. The original concerns are
3 expressed in that first Maliondo paper.

4 Q. Well, I'm --

5 MS. SWENARCHUK: Excuse me, that's
6 entirely consistent with the writing of the paper.

7 MR. FREIDIN: Well, all right.

8 MS. SWENARCHUK: It's your understanding
9 that he's referring to Nykvist and Rosen. Allow him to
10 answer the question as he sees fit. Perhaps your
11 understanding is incorrect.

12 MADAM CHAIR: The Board agrees, Mr.
13 Freidin. If Dr. Hutchinson wants to refer to the
14 Maliondo article as well, that's fine.

15 MR. FREIDIN: Q. Well, that's fine, if
16 you want to refer to that article. But what you're
17 saying is that there's a reference in Maliondo to the
18 Nykvist and Rosen paper; is that what you're saying?

19 A. Yes, but I'm also saying that
20 Maliondo and Mahendrappa in the most recent paper 1990
21 one, with the fancy cover on it, and in the 1988 paper
22 by Maliondo have sections in which they express
23 concerns about soil acidification.

24 Q. All right. Now, Dr. Hutchinson--

25 A. Yes?

1 Q. --I want to ask you questions about
2 the Nykvist and Rosen article that you relied upon.

3 A. Right.

4 Q. I do not want to deal with other
5 articles.

6 A. In that case I will find the Nykvist
7 and Rosen article. I think I'll find it. Can some
8 kind person give me a copy.

9 MR. FREIDIN: Madam Chair, if you don't
10 have it now, you should have the article by Nykvist and
11 Rosen, it's in source book No. 1, it's entitled:
12 Effective Clearfelling and Slash Removal on the Acidity
13 of Northern Coniferous Soils.

14 THE WITNESS: I have got the article.

15 MR. FREIDIN: Q. Would you point out for
16 me, please, where this article supports the conclusion
17 that you have referred to in your witness statement
18 that there was an increase in acidity of the site after
19 full-tree harvesting?

20 A. Well, in my witness statement I'm
21 saying that following slash removal --

22 Q. Where are we referring to in your
23 witness statement, sir?

24 A. Page 19, two thirds of the way down.

25 Q. Yes.

1 A. "In contrast, when slash has been
2 removed from the clearcut site together
3 with the boles then a markedly changed
4 situation occurred. Instead of an
5 increase in pH of 0.5 to 1.0 pH units on
6 average, an average pH decrease occurred
7 of about 0.1 pH units; i.e. the sites
8 acidified."

9 Q. And I'm saying, show me where that
10 conclusion is supported by the article.

11 A. Okay.

12 Q. You don't have the copy of the -- you
13 didn't mark up a copy when you put it in there?

14 A. No, I didn't so I'm having to refer
15 to it.

16 MADAM CHAIR: Mr. Freidin, this might be
17 a good time for our morning break.

18 MR. FREIDIN: Sure.

19 MADAM CHAIR: And give Dr. Hutchinson --

20 THE WITNESS: I will keep searching,
21 Madam Chair.

22 MADAM CHAIR: --time to go through the
23 article and we will be back in 20 minutes.

24 MR. FREIDIN: Thank you.

25 MS. SWENARCHUK: Just to clarify, your

1 question is: Where does the article indicate an
2 increase in acidification with full-tree...

3 MR. FREIDIN: After full-tree harvesting.
4 I'm suggesting to you, Dr. Hutchinson, that it doesn't.

5 MR. HUFF: Full-tree harvest --

6 MR. FREIDIN: Full-tree harvesting, I'm
7 suggesting that it doesn't and that you're in error in
8 your witness statement. You look at the report for
9 that in mind.

10 MADAM CHAIR: Well, Mr. Freidin, one
11 matter. We set last night the date of October 24th for
12 scoping Forests for Tomorrow Panel 3 witness statement.

13 MR. FREIDIN: Yes.

14 MADAM CHAIR: Did you get that
15 information?

16 MR. FREIDIN: I got it this morning.
17 Thank you very much.

18 MADAM CHAIR: Okay.

19 ---Recess taken at 10:20 a.m.

20 ---On resuming at 10:45 a.m.

21 MADAM CHAIR: Please be seated.

22 MR. FREIDIN: Q. I'm looking at the
23 Nykvist and Rosen paper, Dr. Hutchinson, and could you
24 answer my question: Where in that article does it
25 indicate that after full-tree harvesting that the pH

1 went down, or putting it the other way, acidity
2 increased?

3 A. Okay. Well, I see several places
4 where this is referred to. Page 16, conclusions.

5 Q. Page 16?

6 A. I think it's 16. No. 16.

7 Q. 165?

8 A. 168.

9 Q. 168?

10 A. 168.

11 Q. Yes, okay.

12 A. Okay. The first line of the

13 conclusions:

14 "The acidification of forest soils
15 increased with increased biomass
16 utilization. Reduction in soil pH as a
17 result of slash removal was small 0.1 pH
18 units but significant."

19 Q. Okay. Where else?

20 A. Where else? Well, the Figures 3A and
21 3B show comparison with slash removed and without, and
22 with slash left on site over the years, and you will
23 see the one unit that they derive I think is the
24 difference between -- well, let's take one particular
25 one, 3A say, this is pH of humus layer.

1 Q. Where, I'm sorry?

2 A. 165.

3 Q. Right.

4 A. Okay. The pH difference between the
5 with and without slash is -- well, it's a bit difficult
6 to measure, but presumably it's about .1 of a pH unit.

7 Q. All right.

8 A. And that's repeated over the years
9 and so on.

10 Q. All right. I take it then that the
11 conclusion -- your evidence then is based on the
12 comment in the conclusion and the differences in the pH
13 which are demonstrated on Table 3A.

14 I suggest to you, Dr. Rosen - Dr. Rosen -
15 Dr. Hutchinson, if you read the article and you turn to
16 the table which deals specifically with whether there
17 there was a change in pH or not, that you will find
18 that there was indeed no decrease in pH after full-tree
19 harvesting. I would ask you to turn to page 164,
20 please.

21 A. Right.

22 Q. Would you look at Table 2.

23 A. Mm-hmm.

24 Q. Would you look at the third column
25 where it has the bottom four recordings of pH before

1 clearfelling, 3.5, 3.4, 3.8, and 4.2. Do you see that?

2 A. Mm-hmm, yes.

3 Q. And in the next column they measure
4 the pH with slash. Now, if it goes up that means it's
5 less acidic; right, if pH goes up?

6 A. Yes.

7 Q. Would you agree that in the case of
8 pH with slash, in every instance there was an increase
9 in pH and, therefore, that indicates that acidity in
10 fact was less after harvest?

11 A. Yes.

12 Q. Would you agree if you look at the
13 next column, Dr. Hutchinson, that pH without slash;
14 that is, after full-tree harvesting, that there was an
15 increase in the pH and, therefore, a decrease in
16 acidity in each of the four cases that is recorded?

17 A. Well, compared to with before
18 clearfelling?

19 Q. Yes, sir.

20 A. Yes.

21 Q. So your evidence, your witness
22 statement which suggests -- which states that there is
23 a decrease in pH after full-tree harvesting is wrong?

24 A. No, no.

25 Q. And I suggest to you that the

1 conclusion--

2 A. Right.

3 Q. --that you relied on, which says that
4 there is a reduction in soil pH as a result of slash
5 removal being small -- slash removal, really if the
6 conclusion accurately reflected the results of the
7 study it would say this; that there was a decrease in
8 acidity after both tree-length and full-tree, however,
9 the decrease in acidity was greater after tree-length
10 than it was after full-tree. Isn't that an accurate
11 statement of the real conclusion of this paper in
12 relation to changing pH?

13 A. Yes, that's reasonable.

14 Q. That's reasonable?

15 A. That's reasonable.

16 Q. And with respect --

17 A. But I don't think you can just jump
18 in and say the authors are incorrect in their
19 conclusions.

20 Q. You are incorrect, Dr. Hutchinson, in
21 your witness statement because in your witness
22 statement and in your oral evidence--

23 A. Yes?

24 Q. --you unequivocally say that after
25 bole-only harvest there is a rise in pH. You see that

1 on page 19--

2 A. Mm-hmm.

3 Q. --in the sixth line.

4 A. Mm-hmm.

5 Q. You say, going further down:

6 "In contrast, when slash is removed there
7 is a decrease in pH."

8 A. Mm-hmm.

9 Q. You then try to put it in perspective
10 at the bottom of page 19 and you say:

11 "With conventional harvest...", and you
12 go down four lines,

13 "...you will cause a pH increase...",
14 which you're saying with conventional harvest you get a
15 decrease in acidity, and then you go on in the very
16 next line and you say:

17 "When slash is removed from the site this
18 favourable situation is destroyed, soil
19 acidification occurs."

20 Now, you have stated unequivocally that
21 you get a bad result when you full-tree, that you get
22 increased acidification in relation to tree harvest,
23 and I'm suggesting to you that your evidence is
24 absolutely completely in error in that regard in terms
25 of the interpretation of this report.

1 A. The comparison is between full and
2 conventional, and I think that's fairly clear--

3 Q. Will you agree --

4 A. --with this article here.

5 Q. Dr. Hutchinson, would you please
6 answer the question.

7 A. What is the question?

8 Q. Do you agree that your witness
9 statement says that after full-tree harvesting you get
10 a decrease in pH; yes or no?

11 A. It says that but it has to be put in
12 the context of that paper.

13 Q. All right. And I'm telling you that
14 in the context -- you have taken the context of that
15 paper and you have -- you're the one that's taken the
16 results out of context, in my respectful submission,
17 Dr. Hutchinson, but the paper says that there was a pH
18 increase after full-tree and you say there was a pH
19 decrease.

20 A. Let me just read the conclusions, the
21 first line of the conclusions.

22 Q. I'm not -- I'm telling you --
23 suggesting to you, Dr. Hutchinson--

24 A. Yes?

25 Q. --that the conclusion is not very

1 well worded, and if you look at the results, the actual
2 results in Table 2 you find out what the real
3 conclusion is; the conclusion is that after full-tree
4 harvesting in this study--

5 A. Yes?

6 Q. --pH went up after full-tree
7 harvesting. I don't care what the conclusion says,
8 look at the report, or didn't you look at the text?

9 A. Of course I looked at the text.

10 Q. But the text does not support the
11 conclusion, your interpretation of the conclusion that
12 pH went down after full-tree harvesting; does it?

13 A. The context is a comparison of full
14 versus conventional.

15 Q. Right. And if it's a comparison
16 between the two, do you agree or do you not agree, sir,
17 that after both full-tree harvest and tree-length
18 harvest the pH went up?

19 A. Yes, and the hydrogen ion
20 concentration didn't go up as much in--

21 Q. That's right, it didn't go up as
22 much, which means in both cases--

23 A. Right.

24 Q. --the sites became less acidic, but
25 the decrease in acidity was greater; in other words,

1 you had less acidity after tree-length, you had less
2 acidity after full-tree but there was a difference?

3 A. Mm-hmm.

4 Q. You had a great reduction--

5 A. Yes.

6 Q. --in acidity after tree-length and as
7 opposed to full-tree harvest; agreed?

8 A. Absolutely.

9 Q. And I'm suggesting to you, let's just
10 talk about straight English, Dr. Hutchinson. In the
11 situation you've just described the report says,
12 therefore, that after full-tree harvesting--

13 A. Right.

14 Q. --pH increased. Let's not worry
15 about the comparison, it increased.

16 A. Well, the comparison is vital. If
17 you don't want to be worry about it, then you would be
18 correct, but if you're worrying about it in context,
19 then I don't accept your argument.

20 Q. All right. Will you agree that the
21 article says that the pH increased after full-tree
22 harvesting? Let's not worry about the context.

23 A. The data --

24 Q. The data says that.

25 A. The data -- he doesn't say it

1 anywhere, I don't think, but the data you've pointed
2 out indicates that in both cases there was an increase
3 in pH, yes.

4 Q. All right.

5 A. He doesn't say it anywhere. His
6 conclusion in fact was that full-tree harvesting caused
7 less of an acidification. He says --

8 Q. I agree he said that there was less
9 acidification, and I won't belabour this one more very
10 much longer.

11 A. Good.

12 Q. But will you agree with me, sir?

13 A. I've already agreed that the data
14 shows that both of the -- that all of his sites showed
15 an increase in pH --

16 Q. Dr. Hutchinson, would you agree with
17 me please; agree or disagree, your witness statement--

18 A. My witness statement.

19 Q. --where you have taken this paper and
20 you have interpreted it and you have told the Board
21 what it says, you did not say that there was a
22 difference in the change of acidity, you didn't say
23 that there was a decrease in acidity in both cases and
24 that there was a difference in terms of the decrease,
25 you said -- first of all, do you agree you didn't say

1 that?

2 A. I don't believe I did say it, no.

3 Q. What you did say was if you
4 tree-length you get less acid per the pre-harvest --
5 compared to pre-harvest, but if you full-tree you get
6 more acidic situation occurring. That's what you said;
7 isn't it? the sites acidify, you say that right on
8 page 19.

9 A. Yeah, yeah, yeah, I've have said
10 that.

11 Q. That's what you've said. Why did you
12 rely on the conclusion of this report, sir, as opposed
13 to the results which are clearly stated in Table 2 and
14 which indicate the proper interpretation or indicate
15 that the conclusion is misleading in terms of the way
16 it's worded?

17 A. Why did I rely on -- why did I not
18 rely on Table 2?

19 Q. Yes.

20 A. Well, Table 2 is one component of the
21 study, but I was interested in the comparison between
22 full-tree and whole-tree harvesting.

23 Q. Okay. On page 19 and 20 of your
24 witness statement, Dr. Hutchinson, you refer to base
25 saturation of soils and let me just see, I think I've

1 lost my reference to this. Somewhere I know you did.

2 A. Sir, two thirds of the way down I see
3 I refer to base saturation.

4 Q. On page 20?

5 A. No, on page 19.

6 Q. Where do we find that?

7 A. "Nykvist and Rosen measured the
8 nutrient elements, the base saturation of
9 soils..."

10 Q. I'm sorry, where?

11 A. It's about eight lines from the
12 bottom there.

13 Q. Oh, I see. Base saturation, all
14 right. It's right after you say, "the sites
15 acidified", you say:

16 "Nykvist and Rosen measured the nutrient
17 elements, the base saturation of the
18 soils and found that the pH increase
19 could be accounted for by release in
20 water soluble form, et cetera."

21 A. Isn't that interesting, I mentioned
22 from the same paper that -- just to put it in context
23 for you:

24 "Nykvist and Rosen measured the nutrient
25 elements, the base saturation of the

1 soilds and found that the pH
2 increase...", now, am I trying to mislead
3 you by telling you it's a decrease when I've gotten it
4 written in on the slant.

5 Q. Go to the next sentence, please.

6 A. Right.

7 Q. "In the slash removed plots however,
8 the effect of removal was so great that
9 nutrient depletion by the harvest method
10 left insufficient bases to counter the
11 acidification processes."

12 A. Yes.

13 Q. I suggest you were misleading.

14 A. No.

15 Q. Well, if you weren't trying to
16 mislead, your interpretation is misleading.

17 A. Well, let's see what he said about
18 hydrogen ion and aluminum.

19 Q. Well, I think if we go through
20 that -- we'll go through that. Let's go to page 19 --
21 first of all, before you get into this base saturation,
22 will you agree --

23 MS. SWENARCHUK: Excuse me. I think the
24 witness has said he wishes to tell the Board what the
25 author has said about hydrogen ion and aluminum and

1 he's entitled to do that.

2 THE WITNESS: In other words, why did I
3 make that statement there, that's the question, and
4 it's been suggested it's deliberately misleading.

5 MR. FREIDIN: Q. If it's not
6 deliberately, I can withdraw the comment that it may be
7 deliberately misleading, it's just misleading; it's not
8 right, but go ahead.

9 A. Right. Well, that comes directly
10 again from this paper and on page 167 of their paper
11 they say at the bottom there:

12 "The removal of slash did not affect the
13 total cat ion exchange capacity. The
14 single ions and base saturation were,
15 however, affected. Maganese, magnesium
16 and calcium decreased markedly in the
17 humus when the slash was removed from the
18 ground. Aluminum and hydrogen ion...",
19 and hydrogen ion is a measure of pH,

20 "...concentrations increased. An
21 increase of hydrogen ion concentrations
22 is a decrease in pH, and there's an
23 increase in acidification. The
24 differences were significant."

25 Q. All right. And I'm going go through

1 this and I'm going to give you every opportunity to
2 interpret this, but what I'm going to be suggesting to
3 you -- well, let me just take you step by step, we will
4 get back to that. Would you agree, sir, that as base
5 saturations increases pH will go up?

6 A. Yes.

7 Q. Putting it another way, as base
8 saturation increases, acidity will go down; correct?

9 A. Yes.

10 Q. On page 19 of your witness statement
11 you made the comment that there was an increase in pH
12 which was the result of base saturation I believe.

13 A. Yes.

14 Q. And we find that in the sentence we
15 just looked at where it says:

16 "The base saturation of the soils...",
17 "Nykqvist and Rosen measured the nutrient
18 elements, the base saturation of the
19 soils and found that ph increase could be
20 accounted for by release...", et cetera.

21 Now, in the second sentence it says that
22 there was an increase in acidification, this is what
23 you say.

24 A. Right.

25 Q. Because there were insufficient bases

1 to counter acidification. Now, can we agree, sir, that
2 this conclusion is in error in terms of what happened
3 in this paper because there was a decrease in acidity
4 after full-tree harvesting - we had agreed that that's
5 what happened in the paper - and, therefore, if there
6 was a decrease in acidity after harvest, then base
7 saturations would have to have gone up after harvest;
8 right?

9 A. That's right. This is just going
10 round and round the same issue. pH, base saturation
11 and so on are all interconnected. I've already agreed
12 that Table 2 indicates - and that there's never been
13 any dispute in my mind that the pH in all of these
14 sites went up, but the difference between conventional
15 and slash removal was significant.

16 Q. I know, and you keep going back to
17 that, and I'm concerned about the fact that you didn't
18 say that in your witness statement. Let's go to page
19 20 of your witness statement, Dr. Hutchinson.

20 A. Page 20. All right.

21 Q. You say, this is five lines down:

22 "When slash is removed from the site...",
23 i.e., when there is full-tree harvesting,
24 "...this favorable situation is
25 destroyed."

1 It's destroyed -- you said:

2 "Soil acidification occurs..."; right?

3 A. Right.

4 Q. Decrease in pH, soil acidification
5 occurs means a decrease in pH?

6 A. Yes, it does.

7 Q. All right, thank you. Now, if the
8 base saturation decreased after harvest--

9 A. Yes.

10 Q. --am I correct that that might lead
11 to an increased acidity?

12 A. Yes.

13 Q. It would result in an increased
14 number of hydrogen ions. If you have an increase in
15 hydrogen ions that would give you that increased
16 acidity; right?

17 A. Yes.

18 Q. Now, where in the Nykvist and Rosen
19 article can you point me where it supports your
20 proposition that there was a decrease in base
21 saturation after harvest from either full-tree
22 harvesting or tree-length?

23 A. Well, it says that the --

24 Q. Where?

25 A. Page 167 again, the thing we just

1 discussed:

2 "The removal of slash did not affect the
3 total cat ion exchange capacity but
4 the base saturation was, however,
5 affected."

6 And then it points out that aluminum
7 hydrogen ion concentration increased.

8 Q. Sir, would you agree with me that
9 this paper does not have any figures in it which will
10 tell us what the base saturation was before harvest?

11 A. Yes, I think that's true.

12 Q. Okay. Now, if there is no indication
13 in the paper as to what the base saturation was before
14 harvest, and we have agreed already that the pH went up
15 after both full-tree harvesting and tree-length
16 harvesting, would you not agree that one must conclude
17 in terms of base saturation that base saturation must
18 have gone up as well after both--

19 A. That's reasonable.

20 Q. --full-tree harvesting?

21 A. That's a reasonable conclusion.

22 Q. All right. So when you suggest on
23 page 19 of your witness statement four lines -- five
24 lines up from the bottom that:

25 "In the slash removed plots, however, the

1 effect of removal was so great that
2 nutrient depletion by the harvest method
3 left insufficient bases to counter the
4 acidification processes."

5 If we're measuring whether there was an
6 increase or a decrease in acidification after those
7 things--

8 A. Mm-hmm.

9 Q. --after those activities, you have to
10 agree that the base saturations went up and there were
11 bases -- an increased number of bases in the soil after
12 both types of harvest which would counter acidification
13 processes; would you agree?

14 A. But there was less in one than the
15 other.

16 Q. I know there was less in one than the
17 other, but would you agree that there would be bases
18 there in both situations, increase in bases?

19 A. Yes, yes.

20 Q. And you are asking the Board to
21 interpret your evidence that I've just read to you that
22 there was insufficient bases to counter the
23 acidification processes as being a clear statement that
24 base saturation increased in both cases, and all you're
25 talking about is that there was less of an increase in

1 base saturation.

2 A. No, question, this could have been
3 more clearly put.

4 Q. I will certainly agree with you on
5 that.

6 A. Well, that's nice, we've finally
7 agreed on something.

8 Q. Let's go to the abstract, page 157,
9 please.

10 A. Of the same paper?

11 Q. Yes, sir.

12 Q. Now, I think this might deal with --
13 and this summarizes I think in some respects the
14 passage on page 167 that you referred us to that talked
15 about aluminum and hydrogen ions.

16 A. Mm-hmm.

17 Q. And if you look at the abstract in
18 terms of hydrogen and aluminum it says, starting in the
19 third last line:

20 "There is a decrease in exchangeable
21 calcium, manganese and an increase in
22 hydrogen and aluminum."

23 Do you see that?

24 A. Yes, I do see it.

25 Q. And I guess that's sort of along the

1 same lines that you referred me to on page 167?

2 A. Yes.

3 Q. Would you agree with me, Dr.

4 Hutchinson, that based on the results that this report
5 or this study reports regarding pH going up after both
6 tree-length and full-tree and the bases going up after
7 both tree-length and full-tree, that if one wanted to
8 have an accurate understanding of what happened in
9 relation to aluminum and hydrogen, they would have it
10 if someone said that after both types of harvest the
11 aluminum and hydrogen went down but it went down more--

12 A. When slash is left on site.

13 Q. --after tree-length as opposed to
14 full-tree?

15 A. Yes.

16 Q. All right, thank you. Now, we have
17 now agreed the report indicates that there was an
18 increase -- pardon me, a decrease in acidity in both
19 cases?

20 A. Yes.

21 Q. Let's go to the report and let's find
22 out whether the authors says anything about whether the
23 differences were significant or not.

24 A. Okay.

25 Q. In your paper, we agree as starters,

1 that you didn't comment on whether the differences were
2 significant or not; did you?

3 A. Well, if I've quoted that first line
4 of the conclusions, then maybe I didn't.

5 Q. Well, you wrote the paper. I don't
6 think you did, Dr. Hutchinson.

7 A. All right, that's fine.

8 Q. Would you agree with me that you
9 didn't?

10 A. I will agree with you.

11 Q. Thank you. Now, let's go back to
12 Table 2, please. There is a column on the right-hand
13 side of this table. Again, this is the table that
14 indicates that after both full-tree harvesting and
15 tree-length there was a decrease in acidity.

16 It is my understanding, sir, that the
17 last column here has something to do with reporting
18 statistical significance; is that right?

19 A. Yes.

20 Q. To shorten this. Sir, will you agree
21 with me that this table demonstrates that not only did
22 the pH go up in all cases; i.e., the acidity went down
23 in all cases, but that in 50 per cen t-- approximately
24 50 per cent of those cases there was no statistical
25 significance between the pH after tree-length versus

1 full-tree harvesting?

2 A. In three out of eight cases there was
3 not.

4 Q. So what can you agree to in terms of
5 percentages?

6 A. Well, I don't think -- three out of
7 eight, that would be --

8 Q. Three out of eight -- nine isn't it?

9 A. Three out of nine.

10 Q. All right. Then, if we go -- I guess
11 if we want to take close to significant -- well, I'm
12 sorry, hold on a second. Oh, all right. So the not
13 significant is where we get the zeros, close to
14 significant is the one stars; right, in brackets?

15 A. Yes.

16 Q. Okay. So I guess we can do our own
17 calculations. Now, you talked about - you raised it
18 yourself - the results of the study and it refers to
19 hydrogen and aluminum.

20 A. Right.

21 Q. We have agreed -- we have already
22 talked about that, and I want to talk about what the
23 differences were in terms of the amount of hydrogen and
24 aluminum that they measured after tree-length as
25 opposed to -- tree-length versus full-tree harvesting

1 in the same we have just done here with acid.

2 Would you return to Table 3. Table 3
3 which is on page 166. Now, this table is entitled:
4 exchangeable cations in milliequivalents per hundred
5 grams in the humus layer of series A measured at
6 current pH of the soil, means for all experimental
7 sites and it indicates what the symbols mean.

8 It may not be necessary for us to go into
9 much detail on those, but there they are. If we look
10 under the second column, Al 3 plus, which is aluminum I
11 understand, would you agree that this table
12 demonstrates that there was a change in aluminum, if
13 you look at the third number under the aluminum column,
14 of approximately 0.1 -- in fact it's 0.86. I'm
15 sorry --

16 A. Yes.

17 Q. 0.86.

18 A. 84, okay.

19 MS. SWENARCHUK: 86?

20 THE WITNESS: 86, I'm sorry.

21 Q. Or one, 1 milliequivalent; right?
22 Close to 1 milliequivalent?

23 A. Right.

24 Q. Will you agree with me, sir, that
25 that represents 1/20th of the total cation exchange

1 capacity?

2 A. Yes, yes.

3 Q. Now, I don't think I have any more
4 questions on that article.

5 A. Pardon?

6 Q. I don't think I have any more
7 questions on that article. Let's talk about
8 atmospheric acidic inputs. Let's turn to page 17 of
9 your witness statement.

10 Now, this is again at the bottom of page
11 17 in the last paragraph where we start talking about
12 atmospheric acidic inputs. Do you have that, Dr.
13 Hutchinson?

14 A. Yes, I do.

15 Q. I want to examine this topic. Do you
16 agree, sir, that the amount of acid which is found in
17 rain varies from one part of the world to the next?

18 A. Yes.

19 Q. Would you agree that there are two
20 potential methods, that acid rain can affect
21 vegetation, we're just talking -- I'm not saying that
22 this -- all right, can affect vegetation
23 scientifically, that is, through direct effects; i.e.,
24 from deposition on the leaves, for example, is one way?

25 A. Yes.

1 Q. It can also have a potential effect
2 of acid precipitation on vegetation indirectly through
3 the soil?

4 A. Yes.

5 Q. Are you able to agree with me, sir,
6 that there are no direct effects of acid precipitation
7 in Ontario?

8 A. That's the first category, that is
9 direct effects on vegetation?

10 Q. Yeah, the direct effects.

11 A. Yes, I think so.

12 Q. There are no direct effects?

13 A. Well, there's some evidence that
14 there are for some feather mosses, but in general I
15 think that's quite correct. And I should say, there 's
16 some evidence for lichens too.

17 Q. Okay. Do you agree that the acidity
18 of rain is not the same across all of Ontario?

19 A. Yes.

20 Q. Do you agree that it's higher in
21 southern Ontario versus northern Ontario?

22 A. The acidity?

23 Q. Acidity in rain?

24 A. Yes, generally speaking that's true.

25 Q. I ask you to read an article

1 entitled - and I would ask this be marked the next
2 exhibit, Madam Chair. It's an article entitled: Air
3 Pollution in Forests, a Canadian Perspective, the
4 author is Paul A. Addison and the date of the paper is
5 June the 28th, 1990.

6 MADAM CHAIR: That will be Exhibit 1428.
7 How many pages is that, Mr. Freidin, 12?

8 MR. FREIDIN: It says 12. 12 pages.

9 ---EXHIBIT NO. 1428: 12-page article entitled: Air
10 Pollution in Forests, a Canadian
11 Perspective, authored by Paul
A. Addison, dated June 28th,
1990.

12 MR. FREIDIN: Q. This is the Paul or the
13 P. Addison that you referred to in earlier questions
14 from the Canadian Forest Service?

15 A. Yes.

16 Q. One of the experts you referred the
17 Ministry to to answer some questions about dieback and
18 pollution effects?

19 A. Yes.

20 MS. SWENARCHUK: Excuse me. Did Dr.
21 Hutchinson make the reference or did you? As I recall
22 it was you.

23 MR. FREIDIN: He agreed with me that that
24 was his response in the interrogatory.

25 Q. Which I understand that you authored

1 the response?

2 A. Yes.

3 Q. Okay. Can we turn to page 6 of this
4 document, please. Now, in the first paragraph under
5 the heading at the top of the page, Distribution of
6 Pollutants in Canada, there's reference to the various
7 forest regions that one finds, and then in the third
8 sentence, right in the middle of that paragraph, it
9 says:

10 "If we assume that 20 kilograms per
11 hectare of excess sulphate deposition
12 represents a significant pollutant load,
13 we see that it is primarily the hardwood
14 and mixed woods forests that are
15 exposed...", and refers to Figure 2 and I
16 will go to that in a minute.

17 "This means that most of the boreal
18 forest from which we extract the bulk of
19 our forest products is not exposed to
20 high pollutant levels."

21 Are you aware, sir, of the basis on which
22 the figure of 20 kilograms per hectare was chosen?

23 A. Yes.

24 Q. Could you explain the basis on which
25 you believe it was chosen?

1 A. Well, this is looked at, it actually
2 relates primarily to lake systems, so this has looked
3 at areas in which we've got lake acidification taking
4 place and looked at the loadings which are going into
5 those systems, determined that sulphate is the
6 principal acidifying agent in those areas, and then
7 tried to look at, if you like, the losses from the
8 watersheds and the gains in the lakes against inputs,
9 and attempted to come up with a figure which should not
10 cause in - I don't know what time length it is - but in
11 the immediate future any further acidification of
12 the -- the 20 sort of determines how much the watershed
13 should be able to handle on a yearly basis.

14 Q. Okay. So to summarize that, 20
15 kilograms per hectare is the figure which has been
16 accepted as the figure which -- if you have less than
17 20 kilograms per hectare per year, then you're not
18 going to have a problem in terms of the acidification
19 of waterbodies? In layman's terms, is that correct?

20 A. Well, I mean, it's an arbitrary
21 figure of course, but are you suggesting that above
22 that there's a problem, or could be, and below that
23 there's no problem? There's a gray area.

24 Q. There's a gray area.

25 A. Yes.

1 Q. But the scientists in this area have
2 decided they have to pick a number somewhere for the
3 purposes of making decisions.

4 A. Yes.

5 Q. And they've chosen 20 kilograms--

6 A. Yes.

7 Q. --per hectare as sort of the dividing
8 line?

9 A. Right.

10 Q. Now, if you add to soil, acid rain
11 which has a pH which is higher than the soil; i.e., if
12 you add acid rain to soil when the rain is less acidic
13 than the soil--

14 A. Right.

15 Q. --would you expect that there would
16 be any increase in acidity of the soil or would you
17 expect a decrease?

18 A. Well, I wouldn't expect an increase
19 in acidity of the soil probably.

20 Q. Would you expect a decrease in the
21 acidity of the soil?

22 A. No, I would expect that it would get
23 involved in exchange of processes in the soil and that
24 they wouldn't affect the pH much.

25 Q. Okay. My understanding is that in

1 the boreal forest region of Ontario that the normal pH
2 of rain is 4.5. Are you able to -- is that correct?

3 A. That is an accurate figure.

4 Q. If we look at page 6 of this exhibit,
5 Exhibit 1428, and if we look over at the right-hand --
6 pardon me, the left-hand corner, we have all these
7 lines going across and the lines have been given
8 numbers; 35, 30, 25, et cetera

9 A. Mm-hmm.

10 Q. Now, 20 refers to the 20 kilograms
11 per hectare per year; is that right?

12 A. Yes, of sulfur, yes.

13 Q. Right. If we trace the 20 line across
14 the page and across part of Ontario and then off to the
15 right into Quebec, et cetera, would you agree that the
16 location of that 20 hectare line supports the
17 conclusion in the last sentence of the first paragraph
18 on that page that most of the boreal forest from which
19 we extract the bulk of our forest products is not
20 exposed to high pollutant levels?

21 A. Right.

22 Q. Are you familiar, Dr. Hutchinson,
23 with the Acid Rain National Early Warning System?

24 A. What's the acronym?

25 Q. It's called -- well, let me just get

1 it. It's the Acid Rain National Early Warning System.
2 Yes, it has an acronym. Yes, it does, A-R-N-E-W-S,
3 ARNEWS, I guess.

4 A. No, I'm not very familiar with that.
5 Yeah, I'm not familiar with it.

6 Q. All right. So you aren't able to
7 speak with any degree of knowledge then regarding this
8 warning system on page 8 -- which is discussed on page
9 8 and following of this exhibit? I guess that's a
10 pretty fair conclusion to come to?

11 A. Yes, I haven't had any detailed
12 involvement with that.

13 Q. Do you know, sir, whether or not the
14 Ministry of the Environment in Ontario in conjunction
15 with the Canadian government have been monitoring acid
16 rain deposition across Ontario?

17 A. Oh yes, I know that.

18 Q. And they have been doing that for a
19 number of years?

20 A. A long time, yes.

21 Q. About a decade at least?

22 A. More than, yeah.

23 Q. All right. And that those
24 monitoring -- that monitoring has occurred in the
25 boreal forest as well as the Great Lakes/St. Lawrence

1 and southern Ontario?

2 A. I'm not sure about the boreal
3 monitoring, but certainly -- they probably have one or
4 two monitors in the boreal, but certainly in southern
5 Ontario and central Ontario they have a lot.

6 Q. Are you aware, sir, of any monitoring
7 plots in the boreal forest maintained by the Canadian
8 Forest Service for the purposes of assessing forest
9 health?

10 A. Yes.

11 Q. Are you aware as to whether the
12 results of the monitoring by the Canadian Forest
13 Service regarding forest health on those plots is
14 reported?

15 A. Am I aware whether it's reported?

16 Q. Yes. I don't want you to guess, I
17 want you to tell me whether you know or you don't.

18 A. Yes. I couldn't point you directly
19 to a report, no.

20 Q. Okay, thank you.

21 I'm going to venture -- well, I'll leave
22 this one item for a little later.

23 I want to deal with your evidence, sir,
24 regarding the possibility that there be a test lab for
25 forest soils similar to the test lab that is used in

1 Guelph for the purposes of analysing agricultural
2 soils.

3 A. Yes.

4 Q. If I might begin, one of the reasons
5 I want to go into this is the Chair asked you a
6 specific question as to whether -- to which you
7 responded, that the size of the task of developing one
8 of these labs for forest soils would not be greater
9 than the Guelph agricultural testing, and you said you
10 would have to decide on what you meant by being
11 site-specific.

12 Now, let's go to the Mahendrappa article,
13 Exhibit 424. Do you have that, Dr. Hutchinson?

14 A. Yes, I do.

15 Q. Okay. I think we can be quick about
16 this particular article. Just as a starting point for
17 this discussion about your evidence on this matter. In
18 the middle of the abstract it states, five lines down:

19 "Forest crops, unlike agricultural crops,
20 have long rotation periods which make it
21 difficult to apply agricultural methods
22 of estimating potentially available
23 nutrients directly to forest soils."

24 Do you agree with the accuracy of that
25 statement?

1 A. Yes.

2 Q. Now, I want to examine that statement
3 and some of the probable reasons for it and see whether
4 we can get some agreement.

5 A. Is this all -- we're in the context
6 of the suggestion that we might develop a testing lab
7 in the province?

8 Q. That's right. Would you agree, sir,
9 that a farmer's field is plowed; as a result of it
10 being plowed, there is a plow layer and that plow layer
11 is composed of uniform mineral soil across the field?

12 A. Well, it has organic matter in it too
13 of course but, yes, it creates a uniform mixture in the
14 upper layer.

15 Q. All right. So that across the field
16 it's uniform in terms of texture, moisture and organic
17 content, by and large?

18 A. By and large.

19 Q. You could call that a homogenous
20 soil?

21 A. Well, the farmers would disagree with
22 you, but in the context, yes.

23 Q. All right. Now, if we're looking at
24 forestry soils, I would ask whether you agree that
25 those soils would be called heterogeneous because as

1 you go across a site or the forest you find different
2 depths of soil - let's say just a site - different
3 depths of soil, you have vegetation growing on top of
4 the soil, you have a forest floor of varying depths,
5 and states of composition and you have different
6 degrees of leaching across the site.

7 Would you agree that all those factors
8 would support a statement that the forest soil, unlike
9 an agricultural soil, is heterogeneous?

10 A. Well, you've pointed out two features
11 of heterogeneity in forest soil and I agree that forest
12 soils have substantial heterogeneity in the terms you
13 have given me, yes.

14 Q. Okay. Would you agree, sir, that you
15 can get variation in the soil in terms of those
16 criteria within even 20 feet of two samples in the
17 forest, say?

18 A. Yes.

19 Q. And, therefore, if you wanted to get
20 a prediction of a site from a lab result you would have
21 to have a considerably larger number of samples - if
22 you can in fact get enough samples at all - for the lab
23 to tell you what sort of situation you were facing
24 regarding nutrients on that entire site?

25 A. Well, you would have to take a number

1 of samples but, you know, they have to do that for
2 agricultural soils too.

3 Q. I'm suggesting that because of the
4 homogeneity, the homogeneous nature of agricultural
5 soils you wouldn't have to take near the number of
6 samples as you would have to take in a forest soil
7 which is heterogeneous.

8 A. Well, I don't entirely agree with
9 you.

10 Q. Let's see whether -- I'm sorry.

11 A. If we take, say, a jack pine stand of
12 even age then, you know, the area you way wish to
13 sample in would be substantially larger than for a
14 farmer's field, but if you're taking core samples down
15 through the soil, I don't think the numbers would be
16 insurmountable to get a good representation of that
17 site.

18 Q. Okay, that's your opinion. Thank
19 you.

20 A. I mean, otherwise how could we
21 actually characterize -- how can we ever say anything
22 about forest soils at all based on the premise you've
23 given us, and yet there's all kinds written about it.

24 Q. Well, I'm talking about whether --
25 I'm about the suggestion, the possibility of a forest

1 lab, and I'm not talking about the literature and what
2 we can take from the literature.

3 Would you agree, sir, that in terms of
4 the range of soils that -- the range or the types of
5 soils on which agriculture is carried out is quite
6 narrow, that usually you find farming on the more
7 productive, well drained, finer textured soils?

8 A. Well, it's carried out over a wide
9 range of soils but, I mean, the best farming is on the
10 sorts of land you've described.

11 Q. Would you agree, sir?

12 A. Such as marginal farming in the
13 province on marginal sites.

14 Q. All right. Do you agree that forests
15 grow on the full range of soil textures and moisture
16 from the driest, coarsest sand to the wettest clay and
17 on organic soils?

18 A. Yes, they grow on all of those.

19 Q. And I think we have agreed that there
20 is a difference in terms of the rotation, that crops
21 you usually take off every year and forests have a
22 rotation of varying length?

23 A. Right, but that gives us some
24 advantages in terms of this potential lab because you
25 still only have to make your decisions about your

1 forest site fertility kind of once and that might be
2 once over 50 years; whereas the farmers are compelled,
3 since engaged in crop rotation and rapid changes,
4 they're frequently going back to those labs for
5 prescriptions, you know, almost on an annual basis.

6 Q. Well, I suggest to you that in the
7 forest setting or in the agricultural setting the
8 results you get at the beginning of the year are usable
9 and are going to dictate what's going to happen within
10 the year.

11 A. For that crop.

12 Q. For that crop; whereas in the -- so
13 it's immediate -- whereas in the forest setting the
14 test you do will be a nutrient status at a point in
15 time and, therefore, particularly because of the
16 dynamic nature of nutrient cycling in forest soils we
17 have talked about, it would not be as meaningful or
18 managerially useful as information obtained for
19 agricultural purposes?

20 A. Well, it would. It depends what
21 you're trying to do. If you're trying to determine
22 some feeling for site fertility against some of these
23 other indices, I think that would be a useful way --
24 soil testing would be a useful thing to be doing.

25 Q. Okay. Thank you for your opinion.

1 MR. FREIDIN: I have a number of
2 miscellaneous matters which will take us to lunch, and
3 I think I should be finished today, Madam Chair.

4 MADAM CHAIR: Good, Mr. Freidin.

5 MR. FREIDIN: Q. Tree length -- in your
6 evidence you indicated that tree-length leads to an
7 increase in the seed source on site, and we're talking
8 about seed source of conifers?

9 A. Right.

10 MS. SWENARCHUK: Excuse me, could you
11 point us to a sentence that says tree-length leads to
12 an increase in the seed source on site.

13 MR. FREIDIN: All right. Let me put it
14 this way, I won't tell you what you said.

15 Q. Would you agree with me, sir, is it
16 your opinion that tree-length harvesting affects the
17 amount of seed source on the cut-over?

18 A. You mean tree-length conventional
19 versus--

20 Q. Conventional versus full-tree?

21 A. Yes, yes.

22 Q. You believe that it does?

23 A. Yes, I think it does.

24 Q. And I assume that's because of the
25 cones which are attached to the branches which is part

1 of the slash?

2 A. Yes.

3 Q. How often are cones produced on
4 various conifers; do you know?

5 A. Well, it's generally an annual event.

6 Q. All right. Your understanding of
7 silviculture is that it's an annual event on all tree
8 species?

9 A. Not all tree species - well, I
10 wouldn't go that far - but generally it's my general
11 understanding that there's cones, new ones produced
12 each year.

13 Q. Do you have any idea of what the
14 various degrees of -- the periodicity of cone crops are
15 for black spruce, jack pine, white spruce, balsam fir?

16 A. No, I haven't studied that.

17 Q. That's something -- that's in the
18 area of silviculture?

19 A. Yes.

20 Q. And it's for that reason that you're
21 unaware of that?

22 A. I'm just unaware of it.

23 Q. Are there differences in the ability
24 of various species, conifer species to provide seed
25 sources once the cones are on the forest floor?

1 A. I'm sorry, could you repeat that?

2 Q. Are there differences in the ability
3 of various tree species to provide seed sources once
4 the cones are on the forest floor?

5 A. Yes, there are.

6 Q. And in a general way can you describe
7 what those differences are?

8 A. Well, jack pine cones obviously are
9 stimulated by fire to open up, so there's a strong
10 post-fire opening of the cones on jack pine; if they
11 are on the ground they will slowly root and there is
12 some release of seed that way from slash.

13 Now, is the question also: How does that
14 stimulate further production?

15 Q. No, no. I want to know -- I'm trying
16 to find out whether jack pine cones, white spruce
17 cones, black spruce cones, et cetera, all have the same
18 potential to provide a seed source if in fact you leave
19 the slash with the cones in the cut-over.

20 A. I think it differs, but I certainly
21 don't feel that I can answer in any expert way on this.

22 Q. All right. The ability -- if there
23 was a difference in the ability for seeds to be
24 produced through that method, would you agree that it
25 might have an effect on what situations it was more or

1 less important to leave slash on the site?

2 A. Oh yes.

3 Q. In your evidence you referred to the
4 hundred hectare clearcut for jack pine--

5 A. Right.

6 Q. --which forms part of Forests for
7 Tomorrow's terms and conditions. And could you
8 indicate for me, Dr. Hutchinson, how often does seed
9 dispersed from standing jack pine occur?

10 A. You mean, is there a seed rain from
11 jack pine every year? I think it's very limited, the
12 amount that comes down from jack pine. I think it
13 really is stimulated very substantially by fire.

14 Q. Well, do you know how much -- are you
15 willing to give an estimate of how much --

16 A. No, I'm not. I don't know.

17 Q. But it does occur?

18 A. Oh yes. It's not an absolute, I mean
19 it's not just fire or not, so there's some seed gets on
20 to the ground in the absence of fire.

21 Q. From the standing timber?

22 A. Mm-hmm.

23 Q. And is there any difference in terms
24 of the age of the stand -- the jack pine stand standing
25 timber where you might get some seed from the standing

1 timber?

2 A. Yes, there is. Of course in the
3 early years after canopy closure the seed potentially
4 is quite limited and then it increases in the mature
5 stand.

6 Q. I suggest to you, sir, that you've
7 got it wrong.

8 A. Oh, okay.

9 Q. That if there's any jack pine seeding
10 which is going to occur it's going to occur from a
11 standing crop, it will occur from a young stand and
12 negligible from a mature stand?

13 A. Is a young stand defined as -- I said
14 canopy closure. Is the young stand defined as before
15 canopy closure?

16 Q. You tell me what you meant, what age
17 and what stage will you get --

18 A. Well, I'm assuming -- I think we went
19 through canopy closure before. I'm suggesting maybe
20 that's about 20 years.

21 Q. So your evidence is that within 20
22 years, the first 20 years you wouldn't get much seed?

23 A. That's right.

24 Q. From standing jack pine, but as the
25 jack pine stand gets older you would get more?

1 A. Yes, I think at that stage the seed
2 production is -- now, I'm giving you an opinion.

3 Q. Now you're giving my an opinion,
4 you're giving me an opinion on a silvicultural matter.
5 I suggest to you you're not an expert in silviculture
6 and I suggest to you you've got it all wrong, that that
7 is not the case.

8 A. Right.

9 Q. Now, if my information is that jack
10 pine stands produce less seed from a standing crop as
11 they get older, do you have any expertise on which to
12 dispute my comment?

13 A. No.

14 Q. Then why -- I mean, do you feel
15 compelled, Dr. Hutchinson, to answer every question
16 that is asked of you regardless of whether you have any
17 expertise in that area?

18 A. No,

19 Q. Why don't you on occasion say I'm
20 sorry, I'm not an expert in that area, I don't
21 understand?

22 A. If you run back through the
23 transcript, the last ten minutes, I've done that about
24 four times. Why are you saying things like that when
25 I've just on several occasions said I don't know.

1 Q. You've said on many occasions you
2 don't know.

3 A. That's right.

4 Q. There's many occasions, I suggest to
5 you sir, that you have said that you do know because
6 you've given a definite opinion.

7 A. I didn't say I know about that, I
8 said I am giving an opinion in an area which I'm, you
9 know, relatively unfamiliar with.

10 Q. All right. So --

11 A. I mean, what are we playing a little
12 trap to see if I know about jack pine seeding which I
13 told you I didn't.

14 Q. No.

15 A. The thing that doesn't seem to be in
16 dispute is that jack pine is a post-fire species, it's
17 got serotinous cones and most of the stimulation is
18 after fire.

19 Q. I guess what I'm--

20 A. Now then, the rest of it is -- the
21 questions are all to do with what happens in the
22 absence of fire.

23 Q. I guess what I'm doing, Dr.
24 Hutchinson, is that you've given opinions on a number
25 of matters in your evidence.

1 A. Right.

2 Q. There are some areas where you've
3 given opinions on areas where you have limited
4 expertise.

5 A. And this is one of them.

6 Q. And this is one of them.

7 A. Right. If you point me at the
8 others, that will be interesting, but this one I said,
9 here's an opinion.

10 Q. All right. The area of silviculture,
11 we'll let the record speak for itself.
12 Ecologically --

13 A. I hope the record says that I've said
14 no on several occasions in the last ten minutes.

15 Q. Yes, I'm sure it does. Ecologically,
16 sir, would you want jack pine back on a jack pine site?

17 A. Ecologically, yes, that would be seem
18 to be a reasonable thing.

19 Q. And if acceptable regeneration of
20 jack pine could only occur with planting or artificial
21 seeding, would you advocate those methods?

22 A. Yes.

23 Q. Would the same hold true for other
24 species as well?

25 A. Yes.

1 Q. You made a comment in your evidence,
2 sir, that the worst situation for full-tree is with
3 hardwoods because of the amount of nutrients in the
4 foliage. Does full-tree harvesting of tolerant
5 hardwoods occur in the area of the undertaking, Dr.
6 Hutchinson?

7 A. I don't think so. An opinion, just
8 an opinion, I'm not an expert on it.

9 Q. You don't know? Is your answer you
10 don't know?

11 A. I don't know.

12 Q. Does full-tree harvesting of
13 intolerant hardwoods occur in the area of the
14 undertaking?

15 A. Does full-tree harvesting of
16 intolerant hardwoods -- I don't know the situation with
17 respect to full-tree harvesting of hardwoods.

18 Q. So you were just talking
19 theoretically when you said the worst situation for
20 full-tree is with hardwoods because of the amount of
21 nutrients in the foliage?

22 A. That's right, that would be the worst
23 situation.

24 Q. No, but you were just theoretical?

25 A. Yes.

1 Q. Purely theoretical, because you don't
2 know whether that's a common occurrence.

3 A. That's right.

4 Q. In relation to to windthrow, you
5 referred in your evidence, sir, to a tunnel effect I
6 believe.

7 A. Yes.

8 Q. And did I understand you correctly
9 that you were saying because of this tunnel effect
10 there would be an increased wind velocity and,
11 therefore, blowdown along the edges?

12 A. No, at the ends.

13 Q. At the ends?

14 A. Yes.

15 Q. At the ends of what, the tunnel?

16 A. Right.

17 Q. What clearcut pattern do you believe
18 is most likely to produce this effect and, therefore,
19 have the greatest risk for blowdown at the ends of the
20 tunnel?

21 A. I have no opinion on that.

22 Q. I take it then when you gave your
23 evidence you had no particular silvicultural harvest
24 method in mind?

25 A. That's correct.

1 Q. You weren't in your evidence then
2 making any distinction in your mind between large open
3 clearcuts versus block cuts versus strip cuts?

4 A. No, no.

5 Q. Do you have any expertise, Dr.
6 Hutchinson, to respond to the comment that the
7 potential for windthrow is site and species related?

8 A. Well, that seems common sense, but I
9 have no expertise to deal with that.

10 Q. A question about competition. Would
11 you turn to page 3 of your witness statement.

12 MADAM CHAIR: Mr. Freidin, it's going on
13 to twelve. Is this a quick point or...

14 MR. FREIDIN: Sure, that's fine.

15 MADAM CHAIR: Let's take lunch now.

16 MR. FREIDIN: Yes.

17 MADAM CHAIR: All right. The Board will
18 be back at 1:30.

19 MR. FREIDIN I just want to give the
20 parties some articles here, but...

21 MADAM CHAIR: All right.

22 ---Luncheon recess taken at 12:00 p.m.

23 ---On resuming at 1:30 p.m.

24 MADAM CHAIR: Please be seated.

25 Mr. Freidin?

1 MR. FREIDIN: Q. A few more sort of
2 miscellaneous matters, Dr. Hutchinson. On page 3 of
3 your witness statement, first full paragraph, down
4 about four lines, starting out at the right-hand side
5 you say:

6 "The problem of competition from
7 hardwood species on cut-over blocks
8 spruce and jack pine sites seems to be at
9 least in part a function of harvest
10 practices."

11 A. Right.

12 Q. The Ministry asked you in an
13 interrogatory in relation to this matter: In what way
14 is the occurrence or severity of competition influenced
15 by the use of full-tree harvest?

16 A. Right.

17 Q. You will find this in No. 6, if you
18 just want to look at it. Actually I might be able to
19 do this without the --

20 A. Without the interrogatory.

21 Q. Without interrogatory. Let's try.

22 A. Yeah.

23 Q. You indicate that:

24 "Competition from broad leaf shrubs and
25 saplings often able to perform well in

1 high light intensities is a function of
2 forest clearance by mechanical means as
3 opposed to fire."

4 And then you said:

5 "Full-tree or bole harvest are all likely
6 to cause this problem for subsequent
7 re-establishment of coniferous forests."

8 Really I wanted to clarify with you, is
9 it your position that there is a difference in the
10 amount of competition that is created through one
11 method of harvest as opposed to another, or are you
12 saying just generally the competition is a result of
13 mechanical harvesting?

14 A. As opposed to -- yes, yes I am, I'm
15 saying the last one.

16 Q. All right. And by mechanical
17 harvesting what are you referring to?

18 A. Conventional and full-tree
19 harvesting.

20 Q. Okay.

21 A. Indeed I suspect any method of
22 cutting, any method of harvest removal would cause
23 this.

24 Q. I see, okay. But you're not making
25 any distinction then in terms of level of competition

1 or severity between the various methods?

2 A. No, no.

3 Q. Thank you. A question regarding some
4 evidence you gave on stocking assessments, this was
5 during evidence-in-chief, Ms. Swenarchuk was asking you
6 some questions about -- I think she asked you stocking
7 assessments at five years -- is a five-year assessment
8 appropriate to assess forest growth. You answered, it
9 serves some useful function. If it could be followed
10 by an assessment at canopy closure it would give a
11 better idea of how the forest will do over time.

12 A. Right.

13 Q. Okay. Now, have you heard of
14 condition surveys called free to grow surveys?

15 A. Yes.

16 Q. And what are they?

17 A. Well, these are done I think at
18 something like 12 years -- five years and 12 years,
19 it's a sort of reassessment of stocking. Now, I might
20 be wrong.

21 Q. All right. Are you aware as to
22 whether in fact free to grow surveys look at anything
23 other than stocking?

24 A. No, I don't know.

25 Q. You're not. So if I suggested to you

1 that free to grow designation looks at the level of
2 competition and, therefore, a designation of free to
3 grow reflects the professional judgment of the forester
4 as to whether canopy closure will occur and what the
5 working group will be, you aren't in a position to
6 confirm if that is correct?

7 A. No, no.

8 Q. Do you know what the forest resources
9 inventory is?

10 A. No.

11 Q. So just to make that clear, if a
12 forester goes out there and makes a professional
13 judgment and says: I can see what the trees are that
14 we planted, or what we're trying to get back and
15 looking at the level of competition and based on my
16 professional judgment I believe that this stand is free
17 to grow and based on that I can predict that the
18 species -- the predominant species in the canopy will
19 be "x" species.

20 A. Right.

21 Q. That's the sort of thing that you
22 were talking about, I take it, when you were talking
23 about getting a better idea of how the forest will do
24 over time rather than looking at just stocking?

25 A. Yes.

1 Q. Yes. Do you know what the forest
2 resources inventory is?

3 A. I don't think so, no.

4 Q. So again, you wouldn't be able to
5 confirm for me that the forest resources inventory
6 indicates and tracks over time stands by stocking,
7 stand composition and predominant species in terms of
8 canopy?

9 A. I wouldn't be able to confirm that
10 for you, no.

11 Q. You made reference in your evidence
12 to a jack pine/lichen site.

13 A. Okay.

14 Q. And in your evidence you indicated
15 that you would find balsam fir in such a site, the
16 occasional mountain ash on a natural jack pine/lichen
17 site, birch if there had been a disturbance, spruce; do
18 you recall that?

19 A. Yes, yes.

20 Q. Now, Mr. Greenwood gave evidence in
21 Panel No. 10 about what a jack pine/lichen site meant
22 to a forester.

23 A. I see, okay.

24 Q. And there is a photograph No. 11 in
25 the witness statement for Panel No. 10.

1 A. Right.

2 Q. Do you happen to be familiar with
3 that photograph?

4 A. I don't think so, no.

5 MS. SWENARCHUK: What page is that?

6 MR. FREIDIN: I don't know the page.

7 MR. HUFF: 2.

8 MS. SWENARCHUK: Do you have the
9 original?

10 MR. FREIDIN: I don't have the original.

11 Q. Doctor, maybe we can do this
12 without -- I'm not in any way being critical, all I
13 want to do is, the site that Mr. Greenwood described as
14 a jack pine/lichen site--

15 A. Right.

16 Q. --had no understorey and had no
17 species other than jack pine.

18 A. Mm-hmm.

19 Q. And so it would appear that what Mr.
20 Greenwood said was a jack pine/lichen site to a
21 forester--

22 A. All right.

23 Q. --is different from what you had in
24 your mind when you described a jack pine/lichen site.

25 A. Well, I don't know. I can't imagine

1 that it is much different. I mean, the sites that I'm
2 talking about are predominantly jack pine, but they do
3 have some understorey coming up.

4 Q. All right. But if Mr. Greenwood -- I
5 tell you, the only reason I am concerned about this is,
6 if the Board decided they wanted to do something about
7 a jack pine/lichen site we'd have to be pretty sure
8 whether they were talking about the kind of site that
9 Mr. Greenwood described as being what it means to a
10 forester with no -- none of these species you talked
11 about, or whether they were talking about what you were
12 talking about. So...

13 A. I'm absolutely certain that any
14 forester would walk into the sites we're looking at and
15 call them jack pine/lichen sites.

16 Q. Well, I think without the original
17 photograph there's really not much further I can do.
18 We will just have to go on the transcript.

19 You also gave some evidence regarding
20 genetics.

21 A. Yes, I remember that.

22 Q. Would you agree that there is a
23 widely held view that in a genetics program you can
24 manipulate for greater or lesser genetic diversity?

25 A. In a breeding program, or in a

1 selection program.

2 Q. I'm sorry. Your concern was whether
3 I was talking about what kind of a procedure?

4 A. A breeding program, a selection
5 program.

6 Q. What do you mean by a breeding or a
7 selection program? This may be the blind leading the
8 blind, let's try.

9 A. Okay, it may be. Well, I have in
10 mind -- I don't know what you have in mind. If you're
11 trying to manipulate a forest stand in a particular
12 genetic direction, then you would be controlling the
13 genetics or the genotypes of the material you plant
14 there. So if that's the context, can you deliberately
15 artificially restock in a particular direction. Does
16 that answer the question?

17 Q. Can you manipulate that so you can
18 get both lesser or greater genetic diversity in the
19 area that you plant?

20 A. Yes.

21 Q. You can?

22 A. Yes.

23 Q. Okay. Do you agree that through the
24 seed collection and control system in Ontario that
25 genetic diversity within the forest is not reduced?

1 A. No, I don't think I agree on that.

2 Q. You can't agree with that?

3 A. Well, I think it's all a question of
4 degree, but I don't agree with the bald statement.

5 Q. All right. Is it true in some degree
6 then that through the seed collection and control
7 system in Ontario genetic diversity within the forest
8 is not reduced; is it true to some degree and untrue to
9 some degree?

10 A. That's right, yes.

11 Q. Explain to me how that's the case?

12 A. Well, obviously the seed collection
13 system can only collect from, you know, a certain
14 number of seed trees even if that number is really
15 rather large, and compared to the number of trees that
16 are out there, if we're going to produce a subset of
17 what's out there naturally by collecting -- you know,
18 let's just imagine it's a thousand trees from a
19 million, then we've obviously reduced some diversity.

20 So it's degree and that's very different
21 to saying we're just going to collect from one tree
22 which is not what's done.

23 Q. Have you ever practised in the area
24 of forest genetics?

25 A. Practised. You mean, have I

1 selected, have I worked at--

2 Q. Have you worked in the area of forest
3 genetics, developing different -- dealing with genetics
4 of forest species?

5 A. No.

6 Q. Tree improvement, worked in the area
7 of tree improvement?

8 A. No, no.

9 Q. If someone who did work in that area
10 whose professional career focused on that area and they
11 were of the view that genetic diversity within the
12 forest is not reduced through the seed collection and
13 control system in Ontario; would you defer to their
14 opinion in that regard?

15 A. I would have to see the evidence.
16 Right now I would not, but if the evidence was
17 overwhelming, then I would.

18 Q. Do you agree that there are
19 scientists in the area of forest genetics who are of
20 the opinion that genetic diversity increases through
21 this program?

22 A. I don't know, there may be.

23 Q. Can increase, I'm sorry.

24 A. I have no evidence on that.

25 Q. I hope only one question about

1 compaction. Is it your opinion that tracked vehicles
2 is a reason for compaction?

3 A. Would tracked vehicles cause
4 compaction?

5 Q. No. Well, would they -- all right,
6 let's start, would they cause compaction?

7 A. They would cause a certain amount of
8 compaction.

9 Q. Would they --

10 A. But less than tired vehicles.

11 Q. Less than tired vehicles?

12 A. Yes.

13 Q. I want to go back to one area that we
14 dealt with at some length, the hydrological studies
15 where the streamwater was measured.

16 A. Right.

17 Q. I think in response to a number of
18 questions, one particular I recall you said what they
19 were measuring in those cases was concentration in the
20 stream and that isn't -- just because the concentration
21 in the stream met drinking whatever standards, didn't
22 mean -- that didn't tell you how much nutrients were
23 coming off of the site; is that right?

24 A. I said you needed to know both, you
25 need concentration and flow rates rates.

1 Q. Okay. And that you had indicated a
2 concern that although you have the same concentration
3 in the water--

4 A. Right.

5 Q. --in a greater amount of water that
6 was coming off of the land after harvest--

7 A. Right.

8 Q. --that you might have -- you might
9 have nutrients coming off the site that might have an
10 effect on site productivity?

11 A. Right.

12 Q. And can you turn the Sopper article
13 which is in the source book No. 1, and could you turn
14 to page 28, please. Do you have that?

15 A. Yes, I do.

16 MADAM CHAIR: Is that the first page, Mr.
17 Freidin?

18 MR. FREIDIN: No, no. 24 is the first
19 page, 28 is the last page, the second last page I
20 think. It's summary -- it says summary at the bottom
21 right-hand corner.

22 MADAM CHAIR: Yes, yes.

23 MR. FREIDIN: Q. There are lots of
24 articles that talk about the concentrations in streams
25 and talk about whether that is good or bad for the

1 aquatic ecosystem. This paper, Dr. Hutchinson, in the
2 summary in Item No. 2 which says:

3 "The amounts of nutrients discharged
4 following forest clearcutting are
5 generally small in terms of total
6 nutrient capital and should not reduce
7 site productivity."

8 Now, this was a hydrological study.

9 A. Mm-hmm.

10 Q. It makes that relation back which you
11 have been talking about.

12 A. Right.

13 Q. Or indicated a concern about. Are
14 you able to refer to any article which indicates that
15 through this leaching there is or is likely to be a
16 reduction in site productivity; in other words,
17 something that says the opposite of this?

18 A. No, I don't think so.

19 Q. Thank you. Dr. Hutchinson, you were
20 talking yesterday -- actually at the beginning of my
21 cross-examination we were going through your CV and I
22 asked you some questions about what experience, if any,
23 you had in the area of forest ecology or studying the
24 effects of fire--

25 A. Right.

1 Q. --on the forest. And you recall
2 referring me to an article which is reproduced or noted
3 on page 16 of your curriculum vitae, Hutchinson and
4 Freedman.

5 A. Yes.

6 Q. Now, this is the -- I want to show
7 you a document, I want you to tell me whether this is
8 the article that you were referring to? (handed)

9 A. This is on page 16 did you say?

10 Q. Yes. You will see on page 16 you
11 refer to second item the Effects of Crude Oil and
12 Diesel Oil Spills on Sub-Arctic Vegetation near Norman
13 Wells, Northwest Territories, you've got a page number
14 and this looks like it starts at the same page number,
15 2424.

16 A. Yes, that's that article.

17 MADAM CHAIR: Does the Board have this
18 article?

19 MR. FREIDIN: No, the Board doesn't, but
20 perhaps the Board should now that it's been identified.

21 MR. GREENWOOD: (handed)

22 MADAM CHAIR: Thank you.

23 MADAM CHAIR: Do you want that to be an
24 exhibit, Mr. Freidin?

25 MR. FREIDIN: Yes, please.

1 MADAM CHAIR: Exhibit 1429. Could you
2 read in the title then?

3 MR. FREIDIN: Yes, the title is: Effects
4 of Experimental Crude Oil Spills on Sub-Arctic Boreal
5 Forest Vegetation near Norman Wells, Northwest
6 Territories, Canada, the authors are T.C. Hutchinson
7 and W. Freedman, it is published in the Canadian
8 Journal of Botany, Volume 56 at page 2424 to 2433.
9 This exhibit only goes to 32, so it doesn't have the
10 complete bibliography.

11 ---EXHIBIT NO. 1429: Paper titled: Effects of
12 Experimental Crude Oil
13 Spills on Sub-Arctic Boreal
14 Forest Vegetation near Norman
15 Wells, Northwest Territories,
Canada, authored by Hutchinson
and Freedman, published in
Canadian Journal of Botany,
Volume 56, pages 2424 to 2433.

16 MR. FREIDIN: Q. Dr. Hutchinson, when
17 you referred me to this document, when we were talking
18 about your experience in fire ecology, I asked you -- I
19 said to you something along the lines, 'I assume that
20 in terms of the effects of fire -- first of all, you
21 said that it was a comparison.

22 A. Right.

23 Q. Between oil spills and fire.

24 A. Yes.

25 Q. And when I asked you whether or not

1 you relied upon the literature of experts in fire for
2 the comparison, you said no, that you did original fire
3 research when you did the paper; am I correct?

4 A. Yes.

5 Q. Would you show to me, sir, where if
6 anywhere in this paper it indicates you did any
7 original research in relation to fire?

8 A. Well, you have got a place marked on
9 page 2432.

10 Q. 2432?

11 A. Yes.

12 Q. Well --

13 A. That's in the Discussion.

14 Q. All right. In the discussion, and
15 which part is marked, please?

16 A. Well, the first paragraph on the
17 left-hand side.

18 Q. Which says, "There was a large
19 difference..."

20 A. Yes.

21 Q. It says -- all right, let's just read
22 that.

23 "There was a large difference between the
24 burnt forest site and the mature forest
25 site in depth of active layer. This is

1 due to the larger relative amount of
2 insulation reaching the ground surface in
3 the former more open site and indicates
4 the longer term effects of fire on this
5 parameter (i.e., the effect on depth of
6 active layer) of a fire 40 years ago was
7 much greater than that of a relatively
8 recent oil spill although it is
9 recognized that the spill was a small one
10 of low intensity."

11 A. Right.

12 Q. Will you agree with me, Dr.

13 Hutchinson, that the purpose of this study was to
14 describe some of the short-term physical and biological
15 effects of oil spills made at different seasons of the
16 year?

17 A. That was the main purpose, yeah.

18 Q. And when we go to site description on
19 page 2425, you describe the site under the heading Site
20 Description, and you indicate in the fourth line that:

21 "This area has several advantages as a
22 study locale including the following:

- 23 1. The presence of wide-spread black
24 spruce dominated boreal forest;
25 2. Forest communities at different

1 stages of post-fire recovery (i.e.,
2 different successional stages)..."

3 Dr. Hutchinson, my reading of this
4 article suggests that fire came into the picture only
5 to the extent that the two sites that you spread oil on
6 or you did your experiments on were at a different year
7 in terms of their succession; one had been around for -
8 I haven't got the exact period of time - one period of
9 time after fire and the other one had been around a
10 longer period of time after fire.

11 A. Yes, that's right.

12 Q. That is the extent, Dr. Hutchinson,
13 of the reference really to fire and the relationship of
14 fire, as I read the article, and if I'm correct, is
15 that what you would describe as doing original research
16 in fire?

17 A. What was your question yesterday?
18 Did I answer that I did original research in fire?

19 Q. Yes. I asked you: I assume that
20 you -- I assume that you relied on literature and the
21 expertise of others in terms of the effects of fire for
22 the purposes of your comparison. And you said: No,
23 sir - you didn't say sir - you said: No, we did
24 original fire research.

25 And I'm saying, what I've read and the

1 way I read this paper that isn't original fire research
2 by any stretch of the imagination, all it is is the
3 fact that the two sites that you happened to spill some
4 oil on - which is really what you're looking at -
5 happened to have been burnt over at different periods
6 of time.

7 A. Well, I did tell you what the article
8 was about yesterday, I told you it was concerned with
9 oil spills.

10 Q. You told me that it was a comparison,
11 sir, between the effects of oil spills and the effects
12 of fire. It's not that; is it?

13 A. It is, it includes that.

14 Q. The limited part that we read -- just
15 tell me, is that what you characterize as original fire
16 research?

17 A. That tells us something about the
18 long-term effects of fire on depth of active layer.
19 How would you categorize it?

20 Q. Do you define it as original fire
21 research?

22 A. It's a piece of information which
23 relates directly to fire.

24 Q. It's a piece of --

25 A. And you said that you were going to,

1 if you wanted to introduce these things, you would tell
2 me about it yesterday and you didn't do that, so that
3 the other articles I mentioned to you, which I said
4 were government reports, I haven't produced.

5 Q. And, sir, I didn't have the
6 opportunity to look at those articles. I just assumed
7 that you would be familiar with your own articles and
8 you wouldn't feel that you were prejudiced by me
9 referring to them. But thank you very much for your
10 evidence.

11 MS. SWENARCHUK: Excuse me I --

12 THE WITNESS: There's an expansion in the
13 government reports.

14 MS. SWENARCHUK: Thank you. But perhaps
15 the record will indicate whether the term original fire
16 research was actually used, but what my notes indicate
17 is that the witness said that it compares fire effects
18 and oil spill effects regarding the depth of
19 permafrost, something I can't read, particularly with
20 regard to black spruce.

21 MR. FREIDIN: Q. Do you believe --

22 MS. SWENARCHUK: And then, if I could
23 just go on?

24 MR. FREIDIN: Sure.

25 MS. SWENARCHUK: The question, as we have

1 it is: Did you rely on studies re effects of fire?

2 Answer: No, we looked at fire effects on sites in the
3 Northwest Territories.

4 MR. FREIDIN: Q. Do you believe that
5 your experience in fire matters as outlined from this
6 document constitutes you as an expert in fire ecology,
7 Dr. Hutchinson?

8 A. No.

9 Q. Thank you. What about the other
10 articles that you may have referenced--

11 A. Well --

12 Q. --in talking about fire, do you
13 believe that those make you an expert in fire ecology?

14 A. No.

15 Q. Thank you. Now, I want to deal some
16 more with fire and I want to talk about the size of
17 clearcuts, remember this fire versus harvest issue.
18 You said in your evidence that - and I'm quoting you I
19 believe - I don't think one can say that the amount of
20 nutrients removed after full-tree harvesting is equal
21 to or less than after fire. Did I get you right?

22 A. I don't think the amount removed in
23 full-tree harvesting is equal to or less than fire?

24 Q. The suggestion made in your evidence
25 was that the amount of nutrients removed after

1 full-tree harvesting, therefore, is greater than after
2 fire. Is that your evidence?

3 A. Yes, I think that would be.

4 Q. All right. Now, I want to have a
5 little discussion with you about pools. Do we have a
6 black marker?

7 Now, let's see whether we can do this
8 quickly, perhaps without me using that easel. Would
9 you agree, sir, that if we look at a pre-harvest site
10 that the pools of nutrients would consist of the
11 following: the standing tree?

12 A. Mm-hmm, yes.

13 Q. The lesser vegetation on the site?

14 A. Right.

15 Q. The organic layer?

16 A. Yes.

17 Q. And the B and C horizon of the soil?

18 A. Yes.

19 Q. After fire, would you agree that what
20 you would have would be the stem of the tree plus any
21 other branches which had fallen off on to the site?

22 A. Right.

23 Q. You would have any ash which was
24 deposited on the site?

25 A. Right.

1 Q. You would have little or no
2 vegetation?

3 A. You wouldn't have no vegetation, but
4 you would have little.

5 Q. You would have less vegetation than
6 you would in the pre-harvest situation?

7 A. Yes.

8 Q. That you would lose on average about
9 50 per cent of your forest floor in the fire?

10 A. Right, yes.

11 Q. And that your B and C would remain
12 relatively the same?

13 A. Right.

14 Q. Okay. Now, let's go to post-harvest,
15 so those we're talking -- those are all pools. Now,
16 let's go to the post-harvest and let's use the most
17 drastic harvesting method based on your evidence and
18 that is full-tree, we're not going to use conventional,
19 we will use full-tree so we're going to get the most
20 pools removed.

21 A. Right.

22 Q. In that situation you would end up
23 with the stump?

24 A. Mm-hmm, yes.

25 Q. You would end up with your

1 vegetation, you still have your vegetation?

2 A. Right, whatever's left, yes.

3 Q. Well, has anything been removed?

4 A. Well, some of it has been killed.

5 Q. Well, if it's been killed it's on the
6 site and it's going to decompose so it's still there as
7 a pool, so you've got the vegetation that was there
8 prior to harvest?

9 A. Right.

10 Q. You've got not 50 per cent but you've
11 got a hundred per cent of the forest floor which was
12 there pre-harvest?

13 A. Yes.

14 Q. And you've got the B and C?

15 A. Yes.

16 Q. Okay. And in which case, in your
17 opinion, do you have the most pools left after fire or
18 after full-tree harvesting?

19 A. Depends on the size and what sort of
20 fire you've had and what...

21 Q. But in those scenarios where the fire
22 is one where -- all right. Well, why would the size of
23 fire make a difference?

24 A. In that scenario your fire has
25 reduced your organic mat by 50 per cent.

1 Q. All right. Let's assume that that's
2 the situation, that you have reduced 50 per cent of
3 your organic mat. In which situation do you have the
4 greater number of pools left, after fire or after
5 full-tree harvesting?

6 A. Well, in terms of your biomass you
7 would have less I guess after full-tree harvesting.

8 Q. That's in terms of your biomass, but
9 in terms of total pools, don't forget --

10 A. You've still got your B and C there.

11 Q. Pardon me?

12 A. You've still got your B and C pools.

13 Q. You've got that in both situations.

14 A. Yeah.

15 Q. But in terms of the post-harvest you
16 have 50 per cent more forest floor and you've got all
17 of your vegetation; whereas in the post-fire you have
18 got no vegetation and 50 per cent less in the organic
19 floor. Now --

20 A. Right, but you have ash on site.

21 Q. Okay. Are you able to comment, do
22 you have any opinion?

23 A. I don't really have any opinion, no.

24 Q. You also made the comment that, I
25 don't think one can say that significant amount of

1 nutrients come down somewhere else in the boreal
2 forest; i.e., somewhere else other than the burned
3 site, I think is what you meant.

4 A. Right.

5 Q. Is that right?

6 A. There's another part to the sentence.

7 Q. No, I think it was all -- no, that's
8 the end of the sentence. You said, I don't think we
9 can say -- there was two things, there was thing about
10 nutrients, and you said also that significant
11 amounts -- I don't think we can say that a significant
12 amount of nutrients come down somewhere else in the
13 boreal forest.

14 Now, when you said that, did you mean --
15 what did you mean?

16 A. I don't know the context of why I
17 said that.

18 Q. Well --

19 MS. SWENARCHUK: There should be a
20 transcript available, if you're talking about something
21 from direct testimony.

22 MR. FREIDIN: No, this was --

23 MS. SWENARCHUK: Can we not see the
24 transcript at this point?

25 MR. FREIDIN: This was during the

1 cross-examination by the Ministry of the Environment.

2 THE WITNESS: If you can just give me a
3 clue as to what the context was.

4 MR. FREIDIN: Q. Yeah, I'm going to try
5 to do that, sir.

6 A. Okay.

7 Q. It wasn't Ministry of Environment, it
8 was --

9 MS. SEABORN: What was the question, Mr.
10 Freidin?

11 MR. FREIDIN: Hold on, let's just make
12 sure I find the right one.

13 MR. CASSIDY: Well, Mr. Freidin --

14 MR. FREIDIN: Oh, here it is, here we
15 go. The question was -- you were talking about Dr.
16 Methven's evidence, you were asked to look at Volume
17 196, without looking at that document but you can go
18 ahead and look at that if that will help you, Volume
19 196 and you were asked: Do you believe there should be
20 a distinction between the two. Is that of any help?

21 Your answer in relation to Methven,
22 you're saying: He says the amount in the tree versus
23 the order of magnitude less than in the soil is at
24 variance with this, whatever you were looking at. Look
25 it, forget...

1 Do you have an opinion, do you believe
2 that significant amount of nutrients come down
3 somewhere other than on the burn site after a fire?

4 A. Yes.

5 Q. That was an easy way to do it. Would
6 you agree with me, sir, that that is what happens with
7 hot fires?

8 A. Yes, more especially. More
9 especially, yes, it would with hot fires.

10 Q. Can we go to page 67 of the witness
11 statement.

12 A. Are we in 1A?

13 Q. No, we are back in 1. And on that
14 page in the second full paragraph you refer to the
15 Likens study and you make the comment that:

16 "Likens points out that this induced
17 leakiness of a forest ecosystem as a
18 result of clearfelling is in the opposite
19 direction to the normally tight cycling
20 of essential elements in a healthy
21 natural system."

22 A. Right.

23 Q. What's the 'this' that they're
24 referring to?

25 A. This would be -- if it's the Likens

1 public works study, this would be a clearcut.

2 Q. All right. It would be the
3 experiment that they conducted in 1907?

4 A. I would think so, yes.

5 Q. Am I correct that this situation is
6 referring to an undisturbed forest; that is, an forest
7 undisturbed by man or natural disturbance such as fire?

8 A. That -- the healthy natural system?

9 Q. Yes.

10 A. Yes.

11 Q. And is this a situation -- the
12 situation you're referring to one after canopy closure?

13 A. Yes.

14 Q. Do you agree that after disturbance
15 the system is less tight or more leaky, to use your
16 words?

17 A. Yes.

18 Q. Would you agree that this is true
19 after both fire and after harvest?

20 A. Yes.

21 Q. In a disturbance forest would you
22 agree that leakiness after natural disturbance is a
23 normal occurrence?

24 A. In a disturbance forest?

25 Q. Yes, such as the boreal.

1 A. Right, yes.

2 Q. You would agree that leakiness after
3 natural disturbance is a normal occurrence?

4 A. Yes.

5 Q. So one can't categorically say that
6 because a site is leaky that that is necessarily an
7 indicator that the forest is unhealthy?

8 A. No, it's an indication of
9 disturbance.

10 Q. Okay. Is the presence of live
11 vegetation on site important in terms of leakiness?

12 A. Well, if it's growing actively it
13 reduces it.

14 Q. And that is why the importance of the
15 observations made by some of the authors such as Sopper
16 who talk about sites after clearcuts revegetating
17 quickly, that is why it's important that that occurs?

18 A. Yes, that that will reduce the loss,
19 nutrients loss.

20 Q. Let's turn to page 3 of witness
21 statement 1A, please.

22 MR. FREIDIN: My apologies, Madam Chair,
23 I'm getting near the end and, therefore, I'm not quite
24 as organized as I perhaps was at the beginning.

25 Q. Could you take out Exhibit 1419,

1 please, that's the Canadian Forest Fire Statistics.

2 Okay.

3 A. Yes.

4 Q. Okay. In your evidence you indicated
5 that it doesn't seem logical to say that because some
6 fires are large we should have some clearcuts which are
7 also large. You said to Ms. Seaborn that you would
8 disagree with someone who put that forward or who was
9 putting that forth as a rationale for large clearcuts.

10 A. Yes.

11 Q. Correct?

12 A. Yes.

13 Q. In the interrogatories to Panel 1
14 you were asked, this is on -- you made the comment in
15 Panel 1 that the stimulation of jack pine, I want you
16 to follow this, so if you've got Panel 2 -- Panel 1,
17 page 2 - sorry to jump all over here on you - but don't
18 throw away Panel 1A.

19 A. Right.

20 Q. Okay. Where I'm going, I want to
21 examine the opinions that you have given.

22 A. Okay.

23 Q. In Panel 1 on page 2, down in the
24 second paragraph, halfway down, over to the right-hand
25 side you say:

1 "The stimulation of jack pine germination
2 after a fire has been used to suggest
3 large-scale clearances are necessary for
4 healthy forests."

5 A. Right, yes.

6 Q. You were asked in an interrogatory in
7 relation to that very passage:

8 "Please reference the specific MNR
9 evidence relied upon to support this
10 statement."

11 A. All right.

12 Q. And that was one part of the
13 question, and you said:

14 "We do not state...", I want to make sure
15 that this is your position and the position of FFT,

16 "We do not state MNR provided or provides
17 specific statements on this. It is a
18 recurring theme in evidence already
19 presented to the panel in discussions of
20 why fire and clearcuts are similar."

21 So I just wanted to see whether we agree
22 that the Ministry has not specifically indicated that
23 that is the rationale for large-size clearcuts, that is
24 the interpretation of evidence which has been given by
25 the Ministry, that is interpretation by you and or

1 Forests for Tomorrow; is that right?

2 A. Correct, yes.

3 Q. Now --

4 MS. SWENARCHUK: Excuse me. As regards
5 Forests for Tomorrow, you will notice, Mr. Freidin,
6 that the question was asked specifically with regard to
7 MNR evidence, it's not to suggest that I wouldn't think
8 that evidence by the Industry would also tend to be in
9 the same direction. The question was only asked as
10 regards the MNR evidence.

11 MR. FREIDIN: Well, the answer says:

12 "It is a recurring theme in evidence
13 already presented to the panel in
14 discussions of why fires and clearcuts
15 are small (i.e., MNR Panel 9/OFIA Panel
16 6)"; does it not?

17 A. Yes.

18 Q. So I take it then that the inference
19 was obtained through an interpretation of the evidence
20 of both the MNR and the Industry?

21 A. That is I think reasonable, yes.

22 Q. Would you look at the fire statistics
23 for a moment, Exhibit 1419.

24 A. I have got it, yes.

25 Q. Now, Mr. Cassidy spent some time with

1 you talking about averages.

2 A. Mm-hmm.

3 Q. I don't want to deal with that, I
4 want to look at the same tables that he looked at and
5 let's start on page 2 with this exhibit, Table 8.2.

6 And can we agree that at least in 1982,
7 looking at the second column, 63 per cent of the area
8 which was burned was burned in fires which were over
9 200 hectares?

10 A. 1982.

11 Q. 19 -- I'm sorry, 1978. I'm looking
12 at Table 8.2, I'm sorry.

13 A. Okay. So, I'm sorry, could you just
14 repeat your observation.

15 Q. Can you agree if we look at the
16 second column that 63 per cent of the area which was
17 burned in 1978 was burned in fires over 200 hectares;
18 is that right?

19 A. Yes.

20 Q. Can you turn to the next page in
21 1979 -- are you going to turn the page? 1979, we look
22 at the figures, that 95 per cent of the area burned was
23 burned in fires over 200 hectares; right?

24 A. Right, yeah.

25 Q. If we look at 1980, would you agree

1 that 99 per cent of the area burned burned in fires
2 which were greater than 200 hectares in size?

3 A. Yes.

4 Q. Would you agree for 1981 that 97 per
5 cent of the area burned was burned in fires which were
6 larger than 200 hectares?

7 A. Right.

8 Q. In '82, it was 37 per cent of the
9 area burned was burned in fires over 200 hectares?

10 A. Yes.

11 Q. And in 1983, which is the last page,
12 99 per cent--

13 A. Right.

14 Q. --of the area burned was burned in
15 fires over 200 hectares?

16 A. Yeah.

17 Q. Now, so can we assume based on those
18 statistics, Dr. Hutchinson, that the vast majority of
19 the natural forest that we find out there is the result
20 of disturbances; i.e., fire, which are greater than 200
21 hectares in size?

22 A. On an annual basis much of the
23 greatest area is burned by fires of greater than 200
24 hectares.

25 Q. Okay. So that if one regards the

1 natural forest as we find it as being a good thing, we
2 can agree that most of it that we find has been created
3 through large area disturbance, the large area
4 disturbance of fire?

5 A. Well, the vegetation that's growing
6 there has been subjected to large area disturbance
7 fire, yes. It hasn't been created by it; in the
8 absence of fire there would be something there.

9 Q. In the absence of fire there would be
10 something there?

11 A. Oh yes, there would be a forest.

12 Q. But can we agree, sir, that in the
13 boreal forest prior to man's intervention the fire
14 cycle or the frequency of fire in the boreal forest was
15 66 to 100 years?

16 A. 66 to 100 years, the cycle?

17 Q. Yes, sir.

18 A. Well, that would depend where you
19 are, but that's a reasonable number.

20 Q. Is that -- I've asked you to read an
21 article entitled: History and Natural Role of Fire in
22 Ontario by T.J. Lynham, L-y-n-h-a-m, which was
23 published in the Forest Fire Management Symposium, the
24 year of which I cannot give you at the moment, and it
25 occupies pages 43 to 48 of that publication, and have

1 you had an opportunity to read that?

2 A. Yes, I have.

3 MR. FREIDIN: Can we mark that as the
4 next exhibit, please?

5 MADAM CHAIR: That will be Exhibit 1430.

6 ---EXHIBIT NO. 1430: Article entitled: History and
7 Natural Role of Fire in Ontario
8 by T.J. Lynham, published in the
 Forest Fire Management Symposium,
 (pps 43 to 48).

9 MR. FREIDIN: Q. Now, this article was
10 written by a fire research officer with the Canadian
11 Forestry Service, Great Lakes Forest Research Centre in
12 Sault Ste. Marie, Ontario; is that correct?

13 A. Right.

14 Q. And this paper indicates, if you turn
15 over to page 44 -- so we don't confuse them, let's go
16 to 46 first.

17 On the right-hand column under
18 Paleoecological Fire Record, go down to the second
19 paragraph --

20

21 MS. SWENARCHUK: What page, please?

22 MR. FREIDIN: Page 46.

23 Q. And they're talking about the fire
24 cycle in Ontario pre-man disturbance, and they indicate
25 in relation to the extensive period of time starting

1 five lines up from the bottom of the second paragraph:

2 "Six distinct peaks from 770 to 1270 A.D.

3 suggested a fire cycle of about 80 years.

4 This agrees well with Woods and Day's in

5 1976 publication of presettlement fire

6 cycle of 66-100 years in Quetico Park."

7 So is that one of the reasons you agreed

8 with me that the presettlement, pre-man situation?

9 Q. Situation.

10 A. Yes, those numbers largely

11 correspond.

12 Q. The cycle has changed considerably

13 because of fire suppression in this province?

14 A. Right.

15 Q. Would you turn to page 44. Do we

16 agree that -- are you able to agree with the accuracy

17 of the statement just before the heading Presettlement

18 Fire Records, where it says, four lines up -- five

19 lines up:

20 "On the basis of these figures, the

21 present fire cycle in northern Ontario is

22 about 500 years. This probably reflects

23 the increasing effectiveness of fire

24 control in this century."

25 Do you have any reason to doubt the

1 accuracy of that statement?

2 A. No.

3 Q. And based on the reading that you've
4 done, are you able to agree with it?

5 A. That would correspond.

6 Q. That would correspond?

7 A. Right.

8 Q. To what you would have read?

9 A. To my own reading, yes.

10 Q. And if we go up the page 44, the same
11 column, there's reference to an article by Donnelly and
12 Harrington and it says -- let's put this in context,
13 let's go back to where it says, Modern Fire Record on
14 the left-hand side:

15 "Formal fire reporting by the provincial
16 forestry service (now OMNR) began in
17 1917. The first attempt to summarize
18 area burned in Ontario was included in
19 the 1947 Ontario Royal Commission on
20 Forestry. More recently, Donnelly and
21 Harrington (1978) have compiled a
22 detailed atlas of fires covering 200 or
23 more hectares for the period 1921 to
24 1976."

25 So it's a little bit greater period than

1 the few stats we looked at. They continue:

2 "About 95 per cent of the total area
3 burned is represented by these fires."

4 A. Right.

5 Q. Do you have any basis on which to
6 disagree with the accuracy of that statement?

7 A. No.

8 Q. Are you able to confirm the accuracy
9 of that statement based on your readings?

10 A. I couldn't confirm it, but it seems a
11 very reasonable sort of number.

12 Q. So can we agree then from a starting
13 point that the vast majority of the natural forest that
14 we find there out in the boreal forest is a forest
15 which has been subjected to wild fire every 66 to a
16 hundred years and those fires in 95 per cent of the
17 cases approximately have been large-scale disturbances,
18 and by that I mean over 200 hectares?

19 A. Yes.

20 Q. Would you agree, Dr. Hutchinson, that
21 those statistics would -- this would support the
22 proposition or demonstrate the adaptation to and the
23 resilience of boreal forest species to large openings
24 created through fire?

25 A. To fire, yes.

1 Q. And just so I understand where the
2 differences between you and - if there are
3 differences - and others might be, is it your evidence
4 that because those areas are adaptable and resilient to
5 large area disturbances such as fire that you do not
6 believe - correct me if I'm wrong - but I understand
7 you do not believe that that means that boreal forest
8 species are adaptable and resilient to large area
9 disturbances caused through harvest?

10 A. It doesn't follow logically from one
11 to the other because there are differences between fire
12 and harvesting.

13 Q. All right. And you in your direct
14 evidence I think went through those differences between
15 harvest and fire; did you not?

16 A. Some of them, yes.

17 Q. All right. And it's those
18 differences which you make you disagree with my
19 proposition?

20 A. Part of that, yes. Part of it also
21 is the assumption that fire is good, as you say. It
22 seems to me that it does cause nutrient losses from
23 sites and that if we're going to replace fires by
24 clearcuts there's no need to head in that same
25 direction. I mean, I think one could make an argument

1 that some aspects of fire are not good from a
2 nutritional point of view.

3 Q. All right. And all I'm trying to do,
4 and I think perhaps I've done it, I wanted to make sure
5 that I understood where there was a departure perhaps
6 of views--

7 A. Right.

8 Q. --on this issue, and I think I've
9 identified them; have I not?

10 A. Yes.

11 Q. All right. Could we look at Panel 1A
12 witness statement, please.

13 MADAM CHAIR: Mr. Freidin, do you know
14 how much longer you are going to be?

15 MR. FREIDIN: I will be -- maybe I will
16 be around half an hour or a bit more maybe.

17 MADAM CHAIR: We might as well have our
18 afternoon break now.

19 MR. FREIDIN: Sure.

20 MADAM CHAIR: 20 minutes. Thank you.

21 ---Recess taken at 2:35 p.m.

22 ---On resuming at 3:00 p.m.

23 MADAM CHAIR: Please be seated.

24 MR. FREIDIN: Q. Dr. Hutchinson, could
25 you turn to page Roman numeral (iii) of Exhibit 1405A

1 which is your Panel 1A--

2 A. Right.

3 Q. --witness statement, please.

4 A. Yes.

5 Q. I would like to direct you to
6 paragraph 7 two parts, and the first paragraph you talk
7 about hot fires and you talk about nutrients which
8 would leave the site, you indicate that several --

9 "Where losses in the form of gases,
10 volatiles and smoke of several nutrient
11 elements are significant."

12 I think that is consistent with what you
13 told me just before the break?

14 A. Yeah.

15 Q. Then you make the comment that:

16 "During cooler fires, much of the
17 nutrients remain on site resulting in a
18 sudden availability of a large pool of
19 bases for the uptake of surviving roots,
20 stolons, suckers and seedlings."

21 A. Right.

22 Q. When you talk about a cooler fire,
23 are you able to indicate to me what degree centigrade
24 you're talking about? I note you've referenced 500
25 degrees for hot fires. Where do you, or are you able

1 to provide any expert opinion as to the degrees
2 centigrade at which a fire would be regarded as a cool
3 fire, such that there would be a change in the
4 nutrients remaining on site?

5 A. No, I couldn't give you temperatures
6 for that.

7 Q. It is my information, Dr. Hutchinson,
8 that the fires which are over 200 hectares in size, the
9 ones which account for approximately 95 per cent of the
10 area burned, based on the statistics, would to the very
11 large degree be characterised as hot fires. Are you
12 able to agree or disagree with that?

13 A. I'm not surprised to hear that.

14 Q. You're not surprised to hear that?

15 A. No.

16 Q. But do you have the expertise to
17 confirm the accuracy of that?

18 A. No. No, I don't.

19 Q. And if that is the case, the logical
20 conclusion that one could come to is that in 95 per
21 cent of the cases -- pardon me, in the fires which burn
22 95 per cent of the area in the province annually--

23 A. Right.

24 Q. --if they are hot fires, we end up
25 with a situation which you described in the first

1 paragraph on paragraph 7; and, that is:

2 "Where losses in the form of gases,
3 volatiles and in smoke of several
4 nutrient elements are significant."

5 And those include potassium, carbon,
6 sulfur, phosphorus and boron?

7 A. Right.

8 Q. I guess they might come down in an
9 area where there are trees?

10 A. Yes, they might.

11 Q. They might come down in areas where
12 those trees end up getting logged through conventional
13 methods?

14 A. Yes.

15 Q. They might come down in forests where
16 the trees eventually are harvested through full-tree
17 harvesting?

18 A. Right.

19 Q. You make a reference on page -- can
20 you turn to page 4. If we could turn to the second
21 full paragraph where, in the middle, you say:

22 "In the northwestern boreal...", do you
23 see that, the paragraph that begins:

24 "Undoubtedly...", and go down about five
25 lines.

1 A. Okay, yes.

2 Q. This is -- pardon me, this is Arabic
3 4 as opposed to Roman numeral 4, and you state there,
4 five lines down:

5 "In the northwestern boreal region the
6 oldest forests in the range of 300 years
7 are composed of white spruce. They occur
8 as pure stands on the moist flood planes
9 of the river where fire does not have
10 ready access."

11 Am I correct, sir, that the area that you
12 are referring to in this passage is in northern Alberta
13 and the southern Northwest Territories?

14 A. I think I was asked an interrogatory
15 on that and I do believe that was the answer.

16 Q. Yes, it was MNR No. 11, that was
17 where I got the information.

18 A. I think the original information was
19 probably from Rowan and Scotter.

20 Q. Now, we turn to page 5 and under the
21 heading Impacts of Fire on the Forest Floor, and you're
22 talking -- if we go down four lines, starting way over
23 on the right-hand side:

24 "Of particular importance are the depth
25 to which the duff of the forest floor is

1 burned and the temperature that is
2 achieved in this burn. In most rather
3 fast moving summer and spring fires, the
4 patchiness of the burn is striking."
5 Now, we have talked about hot fires--

6 A. Right.

7 Q. --being the ones which burn
8 approximately 95 per cent of the area in the province
9 each year?

10 A. Yes.

11 Q. And when you refer to the patchiness
12 of the burn being striking, are you referring to fires
13 which are cool or are you referring to fires which are
14 hot?

15 A. I'm referring to generally small
16 fires.

17 Q. The small fires being the ones which
18 are under 200 hectares, those?

19 A. Yes.

20 Q. So in terms --

21 A. Certainly you can get patchiness in
22 any fire.

23 Q. But the ones you're referring to the
24 patchiness of the burn being striking, are in the
25 smaller fires?

1 A. Yes.

2 Q. Would you agree with me that the
3 patchiness -- and by patchiness, first of all, what do
4 you mean?

5 A. I mean, you have areas in which
6 there's different degrees of burning of the ground
7 vegetation.

8 Q. All right.

9 A. You also can have areas in which
10 there is trees left standing and still alive and these
11 of there kind of puddles I should say.

12 Q. Now, in the case of the larger fires,
13 the ones which are over 200 hectares.

14 A. Right.

15 Q. The ones which burn more than 95 per
16 cent of the forests -- 95 per cent of the fires are
17 those fires -- pardon me, 95 per cent of the areas
18 burned are in fires that large. Do I take it from your
19 evidence then that the patchiness of the burn is not
20 striking?

21 A. No, you couldn't take it from that
22 evidence.

23 Q. It is my information -- well, do you
24 have an opinion, sir, as to whether the patchiness of a
25 large fire is striking. You indicated that it was

1 striking in the case of a small fire, that's what you
2 meant?

3 A. Right.

4 Q. Are you able to venture or are you
5 able to give me an opinion as to whether it is large --
6 pardon me, the patchiness is striking in a large fire?

7 A. No, I couldn't give you an opinion on
8 that. I couldn't give you any facts on it. All I can
9 say is when I have visited large fires then this
10 patchiness occurs there too, but I don't think there's
11 any comparisons being made of relative percentage
12 patchiness in these fires.

13 Q. So if I suggested to you that in
14 large fires, the ones over 200 hectares, that the
15 patchiness left would be approximately five per cent of
16 the area burned--

17 A. Right.

18 Q. --in any particular fire, would you
19 be in a position to disagree with that?

20 A. No, I would have to reason to
21 disagree with you.

22 Q. Have you read any literature or do
23 you have any basis on which you're able to agree with
24 the accuracy of the statement?

25 A. That five per cent patchy --

1 Q. Yes?

2 A. No.

3 MR. FREIDIN: Madam Chair, I would like
4 to, before I forget, file some interrogatories. The
5 interrogatories that I would like to file are responses
6 to MNR interrogatories for Panel 1, witness statement
7 No. 1, 1405A and they are Interrogatories No. 5, No.
8 20, and from witness statement 1A, 1405B,
9 Interrogatories No. 17, and Interrogatory No. 20.

10 MS. SWENARCHUK: All MNR?

11 MR. FREIDIN: All MNR.

12 MADAM CHAIR: That will be Exhibit 1431.

13 ---EXHIBIT NO. 1431: MNR Interrogatory Nos. 5 and 20
14 (FFT Panel No.1), and Nos. 17
and 20, (FFT Panel No. 1A).

15 MR. GREENWOOD: (handed)

16 MR. FREIDIN: Q. Would you turn to
17 Interrogatory 20 for Panel 1A, please. Perhaps as well
18 you could open your witness statements for Panel 1A at
19 page 13.

20 The interrogatory Question No. 20 for
21 Panel 1A comes from the small paragraph in the middle
22 of page 13 where you state:

23 "The effect of fire in preparing a
24 seedbed suitable for black spruce
25 seedling establishment is not simulated

1 by clearcutting as it is by fire."

2 A. Right, yes.

3 Q. The question which was asked was: Is
4 the author aware of any harvest silvicultural system
5 that more properly simulates the effects of fire; i.e.,
6 other than clearcutting.

7 And your answer was: No, fire makes
8 nutrients immediately available while any treefelling
9 and removal systems will involve a much slower nutrient
10 release.

11 Now, I wasn't sure how to interpret the
12 first sentence in your response. It says, no. Is that
13 to be interpreted as saying there is no harvest or
14 silvicultural system that more properly simulates the
15 effects of fire than clearcutting; Is that the way to
16 interpret that?

17 A. Yes.

18 Q. Thank you. And when it says that
19 fire makes nutrients immediately available while any
20 treefelling and removal systems would involve a much
21 slower nutrient release, if it's one of those hot fires
22 where we have agreed that the precipitation, the ash,
23 et cetera, leaves the burn site, I take it you wouldn't
24 be including nutrients from ash becoming immediately
25 available on those sites and, if so, at least not to a

1 large extent?

2 A. I'm sorry.

3 Q. A little long. Do you want me to
4 shorten it up?

5 A. Do you want to give me a short
6 version of that.

7 Q. You said earlier on hot fires you
8 agree that ash leaves the sites and falls where there
9 is standing timber.

10 A. Yes.

11 Q. We have agreed that 95 per cent of
12 the area burned are in these hot fires?

13 A. Right.

14 Q. And so when you say fire makes
15 nutrients immediately available, I take it that it
16 wouldn't be in the form of the ash because the ash
17 leaves the sites?

18 A. Oh, but some of the ash would stay
19 there.

20 Q. So it's whatever ash--

21 A. Is returned.

22 Q. --doesn't leave the site, is what
23 you're talking about here?

24 A. Yes, yes.

25 Q. And you also say here that the

1 nutrients are immediately available after fire. I take
2 it you're talking about whatever is left there in terms
3 of ash?

4 A. Right, on site, yes.

5 Q. And you say:

6 "While any treefelling and removal
7 systems will involve a much slower
8 nutrient release...", I thought that one
9 of the concerns that you indicated in your earlier
10 evidence about nutrients becoming available for uptake
11 right after harvest is that they would be available to
12 be flushed through the system?

13 A. Well they have to decompose and be
14 liberated first though.

15 Q. Right. But the ash is in a form
16 which is flushable, leachable fairly readily?

17 A. Right.

18 Q. Compared to the forest floor which
19 will decompose more slowly or provide nutrients more
20 slowly?

21 A. Right.

22 Q. I thought that was an advantage.

23 A. Slow release?

24 Q. Yes.

25 A. Well, you mean for the future

1 forests; that's what it potentially is. One of the
2 snags is, is to not having killed off the stems and
3 roots and so on, so you may not be getting it into what
4 you want to get it into.

5 Q. Thank you.

6 A. You might finish up with site
7 conversion to hardwoods.

8 Q. Okay. Would you turn to Exhibit
9 1411, it is a document, the Pattern and Process in a
10 Forested Ecosystem, it's an excerpt.

11 A. I have got it.

12 Q. Do you agree -- now, this is the
13 article where, on page 226, there are a number of
14 recommendations which were put to you or you discussed
15 one by one during your direct examination; is that
16 right?

17 A. Yes.

18 Q. And they are specifications which are
19 being recommended by the author in relation to, as we
20 see on page 226 just before the recommendations,
21 stem-only clearcutting procedures.

22 A. Yes, that's right.

23 Q. That these are -- clearcutting
24 stem-only systems should meet following specifications.
25 Do you agree, Dr. Hutchinson, that this study was in

1 relation to the northern hardwood forest in New
2 Hampshire and not the boreal forest?

3 A. Yes.

4 Q. Was it your intention in your
5 evidence that these recommendations be considered as
6 applicable to the boreal forest?

7 A. Hmm. No, many of these are quite
8 specific for the hardwood forests, but the overall, if
9 you like, theme is one which seems to bear
10 consideration for boreal too.

11 Q. Well --

12 A. That is, in terms of clearcutting.

13 Q. The authors didn't suggest that these
14 were applicable to the boreal forests; did they, Dr.
15 Hutchinson?

16 A. No, no, they were talking about the
17 Hubbard Brook ecosystem.

18 Q. And are you suggesting that you have
19 enough expertise in the area of silviculture to say
20 that these recommendations make sense in relation to
21 clearcutting in the boreal forest?

22 A. I don't think I have said that.

23 Q. I'm asking you whether you feel you
24 have got the expertise in silviculture--

25 A. No.

1 Q. --to be able to make that comment?

2 A. No.

3 Q. Do you agree, sir, that the northern
4 hardwood forests of New Hampshire -- pardon me, do you
5 agree that the United States Forest Service classifies
6 parts of the lake states of the United States,
7 Minnesota/Michigan, as boreal and that the northern
8 hardwood forests of New Hampshire is a separate
9 classification?

10 A. Yes.

11 Q. I believe that the exhibit that you
12 are looking at comes out of the book that I'm showing
13 you Pattern and Process in a Forested Ecosystem by
14 Likens; is that correct?

15 A. Yes, that's right.

16 Q. I'm showing you page 8 of that book
17 and would you agree with me, sir, that the author
18 delineates on a map the area that is being referred to
19 as the northern hardwood forests and would you agree,
20 sir, that he equates -- he includes, pardon me, the
21 area which has been described as the Great Lakes/St.
22 Lawrence Forests of Ontario, in fact he's equating the
23 two?

24 A. Well, he's got some overlap, yes.
25 He's got quite a lot of our Great Lakes/St. Lawrence in

1 there.

2 Q. ...Doesn't have boreal in there; does
3 he?

4 A. Not the way we define it, no.

5 Q. In fact he says in relation to this:
6 "The northern hardwood forest ecosystem
7 at or and around Hubbard Brook is part of
8 an extensive forest type that lies
9 between the boreal forest to the north
10 and the main body of the deciduous forest
11 to the south."

12 A. Right.

13 MR. FREIDIN: All right. So I'm not
14 going to enter that as an exhibit, but there is the map
15 that was being referred to in the evidence, page 8.

16 Q. So we can agree, sir, that the
17 recommendations made by these authors are in relation
18 to the northern hardwood forests?

19 A. Yes.

20 Q. And, therefore, these
21 recommendations, I assume you will agree, that if they
22 can be regarded as applicable to the area of the
23 undertaking at all, it is only in relation to that part
24 of the area of the undertaking which has been included
25 in the northern hardwood forests, and that is the Great

1 Lakes/St. Lawrence Forest?

2 A. That's right.

3 Q. Would you please refer to
4 paragraph -- pardon me, page 225 of Exhibit 1411 which
5 is an excerpt from the text. Do you have that, sir?

6 A. Yes, I do.

7 Q. I refer you to the right-hand side of
8 the page, heading: Acceptability of Clearcutting. All
9 right?

10 A. Yeah.

11 Q. Go down to the second paragraph.

12 A. Right.

13 Q. It says:

14 "Our studies suggest that many
15 similarities exist between redevelopment
16 occurring in clearcut ecosystems and in
17 operations in the forest created by
18 naturally occurring treefall."

19 Remember they're talking about the
20 northern hardwood forest here.

21 "This suggests to us that clearcutting
22 has the potential to work with nature
23 rather than against it, and that
24 clearcutting may be considered as an
25 ecologically acceptable procedure in

1 White Mountain northern hardwood forests.
2 However, it also is apparent that a
3 misuse of stem-only clearcutting can lead
4 to unnecessary short and long-term
5 degradation of the forest ecosystems."

6 And I suggest to you that as a result of
7 that concern, they give rise -- or they set out the
8 specifications which we find on the following page.
9 Would you agree with that, sir?

10 A. Yes.

11 Q. If these authors, who have been
12 involved in the long-term study of forested ecosystems
13 in New Hampshire article upon article that we have
14 referred to throughout your evidence, have come to the
15 conclusion that clearcutting may be considered as an
16 ecologically acceptable procedure, and I'm going to put
17 in the words in the Great Lakes/St. Lawrence Forest
18 because they include it, in the northern hardwoods
19 forests, what ecological basis do you rely on to
20 support term and condition 2(i)(h) of Forests for
21 Tomorrow. Take a look at Exhibit 1416. Do you have
22 that?

23 A. Yes.

24 Q. 2(i)(h) says -- it's on page 3, you
25 will note that in 2(i)(h) Forests for Tomorrow have

1 suggested a term and condition for the tolerant
2 hardwood species the shelterwood or selection harvest
3 method shall be utilized. By doing that they're
4 leaving out clearcutting.

5 And my question for you is: Having
6 regard to the conclusion of the authors in this paper
7 that clearcutting may be considered as an ecologically
8 acceptable procedure in the northern hardwood forests
9 if you follow certain specifications, on what
10 ecological basis do you say that the proposed term and
11 condition is reasonable?

12 A. So you're asking why one couldn't go
13 to the system, to their endorsement of clearcutting?

14 Q. Sure, I suppose that's one way of
15 putting it.

16 A. Well, you have been at pains to point
17 out that one can't extrapolate from one site to another
18 and there is a concern with generally fairly steep
19 slope sites, and Forests for Tomorrow -- well, I don't
20 quite know what this refers to so, you know, I have
21 difficulty in trying to defend one against the other.

22 Q. Well, maybe you shouldn't put
23 yourself in the position of having to defend Forests
24 for Tomorrow, put yourself in the position of an expert
25 witness who is independent and answer my question,

1 doesn't it -- if this is true, if there is no
2 ecological -- pardon me, if it's an ecologically
3 acceptable procedure to follow in the northern hardwood
4 forests if you follow those specifications, and the
5 northern hardwood forest is a very large area.

6 A. Right.

7 Q. Which includes, according to the
8 authors, the Great Lakes/St. Lawrence Forest based on
9 that map, then do you have any professional basis on
10 which to say that clearcutting is not ecologically
11 acceptable if it's done under those conditions?

12 A. No, no, in the context of what
13 they're talking about I have no reason to disagree with
14 them.

15 Q. Now, you made a reference to the fact
16 that these sites happen to be on mountains.

17 A. Mm-hmm.

18 Q. Steep slopes.

19 A. Right.

20 Q. Would you agree with me that in terms
21 of when you harvest on steep slopes, on mountains, one
22 of the concerns that one would have, if you're
23 clearcutting, might be erosion?

24 A. That's right, yes.

25 Q. Would you agree with me, sir, where

1 you don't harvest on such steep slopes the concern
2 about erosion would be less?

3 A. Yes.

4 MR. FREIDIN: I have no further questions
5 for this witness.

6 MADAM CHAIR: Thank you, Mr. Freidin.

7 Ms. Swenarchuk, would it be better to
8 start tomorrow morning?

9 MS. SWENARCHUK: I would prefer that.

10 MADAM CHAIR: You're going to need a few
11 minutes in any event and there is no point in us
12 breaking now and coming back before four o'clock.

13 All right. We will start at nine o'clock
14 tomorrow morning.

15 MR. CASSIDY: Can Ms. Swenarchuk just
16 give us a ballpark on how long she anticipates being.
17 Is it still the one to two hours that she indicated
18 yesterday?

19 MS. SWENARCHUK: Yes, I think so.

20 MR. CASSIDY: So then we will be in a
21 position to start Panel 2 following probably somewhere
22 after the morning break; is that correct?

23 MR. LINDGREN: That's correct.

24 MADAM CHAIR: Thank you, Mr. Lindgren.

25 Tomorrow morning at nine o'clock then.

1 ---Whereupon the hearing adjourned at 3:45 p.m., to be
2 reconvened on Wednesday, October 17th, 1990,
3 commencing at 9:00 a.m.

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